SYSTEM, METHOD, AND ARTICLE OF MANUFACTURE FOR FORECASTING AND STRESS TESTING USING A NETWORK-BASED PERSONAL INVESTMENT MANAGER

FIELD OF THE INVENTION

The present invention relates to risk management and more particularly to risk management analysis for personal investment portfolios of stocks and bonds.

BACKGROUND OF THE INVENTION

Individuals typically engage in extensive planning to develop a comprehensive financial plan that will aid them in achieving their financial goals. Traditionally, many individuals have entrusted their financial plans to personal financial advisors. More recently, however, individuals have increasingly relied upon computer-based systems that organize their financial assets and liabilities and further provide them with a summary of their financial health. However, these systems tend to focus on the administrative aspects of financial planning without enabling the user to make reasoned choices about their financial futures. Furthermore, these systems are limited by their inability to dynamically analyze the financial goals. These limitations are counterproductive to the user's needs to develop and manage an integrated personal financial plan from an executive decision-making perspective.

Many existing financial management systems allow users to electronically organize their financial assets and liabilities. These systems typically focus on presenting the user with a transactional summary of their financial health. However, these systems fail to capture the user's financial intentions and expectations about their future. Furthermore, these systems typically rely on the user to continually update their personal financial data. As a result, these systems are merely data-driven calculators

that are incapable of providing the user with meaningful financial advice tailored to their financial intentions and expectations.

Similarly, some financial management systems present a static view of the user's financial health. These systems typically require the user to provide the most current financial data relating to their financial assets and liabilities. Consequently, when the user wishes to develop or update their financial plan, the user must input their most recent financial information. This problem is further exacerbated by the fact that these systems demand a lot of typing and guessing when the user enters their financial data. This process is time-consuming and inefficient and does not promote an intuitive understanding of how complex financial variables interact to produce a sensible financial plan.

Another problem with many existing financial management systems is that the user is typically limited to managing the transactional details of their financial data. In these systems the user is shielded from the planning and deciding aspects of developing their financial plan. Accordingly, the user learns very little from the process and remains heavily dependent on the system to provide an accurate summary of their financial health. These limitations further exacerbate the lack of trust inherent within the relationship between the user and the financial management system.

Furthermore, many existing financial management systems merely project a future value of the user's financial portfolio without providing an indication of the likelihood of achieving that value. Thus, the user is left without any real sense of how to compare one financial plan to another. Consequently, these systems fail to foster a deeper understanding of the risks and/or rewards associated with reasoned financial planning.

No system currently exists that dynamically incorporates all of the user's financial assets and liabilities into an integrated summary of their health. Individuals do not

want to focus on the transactional details of their financial information. Instead, individuals desire to assume an executive decision-making role in managing their financial life. A financial management system is needed where the user is provided with an integrated summary of their financial health and is given personalized financial advice tailored to their financial goals and intentions, especially with respect to risk management.

SUMMARY OF THE INVENTION

A system, method and article of manufacture are provided for forecasting and stress testing. First, current positions of one or more investments of a user are obtained via a network. Then, the investments are filtered based on selected securities characteristics. A forecast and stress analysis is then generated based on selected portfolio characteristics of the current positions. Finally, the forecast and stress analysis is transmitted to the user utilizing the network.

In one embodiment of the present invention, the forecast and stress analysis is generated by projecting a current value of the current positions forward using a compound growth factor. Optionally, the forecast and stress analysis may be generated by projecting a current value of the current positions forward using a volatility from a historical portfolio analysis. Also optionally, the forecast and stress analysis may be generated by applying compound growth and volatility using back-tested parameters to determine a future portfolio value.

In one aspect of the present invention, the forecast and stress analysis is generated by representing growth as an annuity with regular contributions to determine a further portfolio value. Additionally, a future portfolio value when future markets are different from past markets may be determined.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

Figure **1** is a flowchart illustrating a method for performing risk analysis in accordance with an embodiment of the present invention;

Figure **2** is a schematic diagram of a hardware implementation of one embodiment of the present invention;

Figure **3** is a flowchart illustrating a method for performing a historical portfolio analysis, in accordance with one embodiment of the present invention;

Figure **4** is a flowchart illustrating a method for performing a current portfolio analysis, in accordance with one embodiment of the present invention;

Figure **5** is a flowchart illustrating a method for performing a current trade impact analysis, in accordance with one embodiment of the present invention;

Figure **6** is a flowchart showing a method for forecasting and stress testing in accordance with one embodiment of the present invention;

Figure **7** illustrates how the present invention serves as a value-added layer for managing and coordinating advisory and transactional service;

Figure **8** is an overview block diagram of a financial management system;

Figure **9** is a block diagram of the technical architecture supporting a financial management information system;

Figure **10** is a more detailed block diagram of a financial management information system;

Figure **11** is a block diagram of a life path model;

Figure **12** is a more detailed block diagram of an advice engine;

Figure **13** is a flowchart of the logic followed by a financial management information system;

Figure **14** is a flowchart of the logic followed by a life path model;

Figure **15** is a flow diagram illustrating an exemplary embodiment of the present invention that effects an improved personal financial planning and management program incorporating means and/or methods of implementing, coordinating, supervising, analyzing, and reporting on investments in an array of assets and borrowings from a variety of credit facilities;

Figure **16A** illustrates an exemplary welcome screen according to one embodiment of the present invention;

Figure **16B** is an exemplary screen print of a graphical user interface of the financial management system;

Figure **16C** is a sample screen print showing an interactive computing environment related to the life path model;

Figure **17** is a simplified block diagram illustrating a financial analysis system in accordance with one embodiment of the present invention;

Figure **18** illustrates an advice summary screen according to one embodiment of the present invention;

Figure **19** is a flow diagram illustrating a method of depicting recommended financial product portfolios according to one embodiment of the present invention;

Figure **20** is a flow diagram illustrating a method of updating a recommended portfolio based on a user specified constraint according to one embodiment of the present invention;

Figure **21** illustrates an investment portfolio management method utilizing a coaching engine in a network based financial framework in accordance with one embodiment of the present invention;

Figure **22** is a flowchart illustrating a method for automated portfolio generation utilizing a network in accordance with one embodiment of the present invention;

Figure **23** illustrates a flowchart for modeling an existing financial portfolio in accordance with one embodiment of the present invention;

Figure **24** illustrates a flowchart for a method that generates a portfolio in a network-based financial framework in accordance with one embodiment of the present invention;

Figure **25** is a flowchart setting forth a method for setting risk tolerance in a network-based financial framework in accordance with one embodiment of the present invention;

Figure **26** illustrates a flow diagram for determining an investment style in a network-based financial framework in accordance with one embodiment of the present invention;

Figure **27** illustrates a flow chart for determining a market attitude in a network-based financial framework in accordance with one embodiment of the present invention;

Figure **28** is a flowchart illustrating a method for affording a graphical user interface in an investment management framework in accordance with one embodiment of the present invention;

Figure **29** is a flowchart illustrating a method for providing a communication medium in a financial management framework in accordance with one embodiment of the present invention;

Figure **30** is a flowchart illustrating a method for filtering a list of companies in an investment management framework in accordance with one embodiment of the present invention;

Figure **31** is a flowchart illustrating a method for generating a risk/reward map in a graphical user interface in accordance with one embodiment of the present invention;

Figure **32** is a flowchart illustrating a method for providing coaching in a graphical user interface in accordance with one embodiment of the present invention;

Figure **33** is an exemplary graphical user interface that embodies the various concepts and methods set forth in Figures **28-32**;

Figure **34** is a flowchart of a process for aggregating an individual historical portfolio in accordance with an embodiment of the present invention;

Figure **35** is a flowchart of a process for filtering investments based on portfolio characteristics using a network-based personal investment manager in accordance with an embodiment of the present invention;

Figure **36** is a flowchart of a process for portfolio forecasting using a network-based personal investment manager in accordance with an embodiment of the present invention;

Figure **37** is a flowchart of a process for gauging past, present and future performance of an investment portfolio in a network-based personal investment manager in accordance with an embodiment of the present invention; and

Figure **38** is a flowchart of a process for providing a portfolio history in a network-based personal investment manager in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure **1** is a flowchart illustrating a method **10** for performing risk analysis in accordance with an embodiment of the present invention. First, in operation **12** a historical portfolio analysis of a user portfolio is performed. Then, in operation **14**, a current portfolio analysis of the user portfolio is executed. An impact of a current trade on the user portfolio is then determined using the current portfolio analysis as indicated in operation **16**. Finally, the user portfolio is forecasted and stress tested utilizing the historical portfolio analysis. See operation **18**.

The present invention provides risk management and reporting capabilities for personal investment portfolios of stocks and bonds. The present invention allows customers to be able to quantify the risk associated with their equity holdings for the first time. Currently risk management for personal portfolios is based on judgement and gut feel. The brokerage industry is currently facing a number of challenges and opportunities related to this. Too many optimistic self-directed investors are assuming levels of risk they are not aware of and cannot afford. As well, regulators are concerned about the lack of controls in the trading environment potentially resulting in widespread losses and liability litigation.

Most investors do not understand the likelihood of reaching their investment goals, and what picks they should be making to increase their chances of success. Clients want to understand both historical performance and possible future performance in order to improve decision-making. The present invention can address both, with or without advisor support, allowing the business to meet the aggressive growth expectations the market values highly.

The present invention helps investors to objectively quantify the risk and reward in their personal portfolios. It supports investors in making optimal picks to meet their investment goals and avoid unaffordable losses.

The present invention helps to build a common language, metrics and tools to quantify risk so that the investing public can proactively manage it. The present invention provides a rigorous process for managing personal portfolio risk.

Currently, risk management is a vague area which advisors and clients typically address using judgment and gut feel. Advisors and brokerage firms need to quantify risk to mitigate legal liability. In addition, investors want to quantify the impact of individual picks on their portfolio risk/reward. Further, regulators will be supportive of processes that help investors to become more knowledgeable about risk and avoid unaffordable losses. Finally, the brokerage industry needs to outsource risk management services to avoid any additional technology problems and to ensure third party objectivity.

Many investors build their own spreadsheets to understand their portfolio performance. The present invention provides new tools to benchmark portfolio performance and set a new industry standard for reporting and analysis. Preferably, the present invention is available 24 hours a day, seven days a week and requires no human intervention. Moreover, the present invention can inform clients about risk using plain language and simple graphic representations. This broadens the target audience to include all investors.

The present invention is initiated by the client from the brokerage's Web site. However, many of the application components may reside on the client. The application may either be downloaded from the Web site or provided on a CD ROM. The client-side application of the present invention reaches out to the secure web site for required data feeds and possibly more complex computation. Historical customer data is stored on the client to avoid complex data storage issues on the server. Customers are offered a secure back-up capability to a third party's address. If a client wants to share information with their advisor, historical account information is automatically uploaded to the advisor with the client's permission.

A preferred embodiment of a system in accordance with the present invention is preferably practiced in the context of a personal computer such as an IBM compatible personal computer, Apple Macintosh computer or UNIX based workstation. A representative hardware environment is depicted in Figure **2**, which illustrates a typical hardware configuration of a workstation in accordance with a preferred embodiment having a central processing unit **10**, such as a microprocessor, and a number of other units interconnected via a system bus **12**. The workstation shown in Figure **2** includes a Random Access Memory (RAM) **14**, Read Only Memory (ROM) **16**, an I/O adapter **18** for connecting peripheral devices such as disk storage units **20** to the bus **12**, a user interface adapter **22** for connecting a keyboard **24**, a mouse **26**, a speaker **28**, a microphone **32**, and/or other user interface devices such as a touch screen (not shown) to the bus **12**, communication adapter **34** for connecting the workstation to a communication network (e.g., a data processing network) and a display adapter **36** for connecting the bus **12** to a display device **38**. The workstation typically has resident thereon an operating system such as the Microsoft Windows NT or Windows/95 Operating System (OS), the IBM OS/2 operating system, the MAC OS, or UNIX operating system. Those skilled in the art will appreciate that the present invention may also be implemented on platforms and operating systems other than those mentioned.

A preferred embodiment is written using JAVA, C, and the C++ language and utilizes object oriented programming methodology. Object oriented programming (OOP) has become increasingly used to develop complex applications. As OOP moves toward the mainstream of software design and development, various software solutions require adaptation to make use of the benefits of OOP. A need exists for these principles of OOP to be applied to a messaging interface of an electronic messaging system such that a set of OOP classes and objects for the messaging interface can be provided.

OOP is a process of developing computer software using objects, including the steps of analyzing the problem, designing the system, and constructing the program. An object is a software package that contains both data and a collection of related structures and procedures. Since it contains both data and a collection of structures and procedures, it can be visualized as a self-sufficient component that does not require other additional structures, procedures or data to perform its specific task. OOP, therefore, views a computer program as a collection of largely autonomous components, called objects, each of which is responsible for a specific task. This concept of packaging data, structures, and procedures together in one component or module is called encapsulation.

In general, OOP components are reusable software modules which present an interface that conforms to an object model and which are accessed at run-time through a component integration architecture. A component integration architecture is a set of architecture mechanisms which allow software modules in different process spaces to utilize each others capabilities or functions. This is generally done by assuming a common component object model on which to build the architecture. It is worthwhile to differentiate between an object and a class of objects at this point. An object is a single instance of the class of objects, which is often just called a class. A class of objects can be viewed as a blueprint, from which many objects can be formed.

OOP allows the programmer to create an object that is a part of another object. For example, the object representing a piston engine is said to have a composition-relationship with the object representing a piston. In reality, a piston engine comprises a piston, valves and many other components; the fact that a piston is an element of a piston engine can be logically and semantically represented in OOP by two objects.

OOP also allows creation of an object that "depends from" another object. If there are two objects, one representing a piston engine and the other representing a piston

engine wherein the piston is made of ceramic, then the relationship between the two objects is not that of composition. A ceramic piston engine does not make up a piston engine. Rather it is merely one kind of piston engine that has one more limitation than the piston engine; its piston is made of ceramic. In this case, the object representing the ceramic piston engine is called a derived object, and it inherits all of the aspects of the object representing the piston engine and adds further limitation or detail to it. The object representing the ceramic piston engine "depends from" the object representing the piston engine. The relationship between these objects is called inheritance.

When the object or class representing the ceramic piston engine inherits all of the aspects of the objects representing the piston engine, it inherits the thermal characteristics of a standard piston defined in the piston engine class. However, the ceramic piston engine object overrides these ceramic specific thermal characteristics, which are typically different from those associated with a metal piston. It skips over the original and uses new functions related to ceramic pistons. Different kinds of piston engines have different characteristics, but may have the same underlying functions associated with it (e.g., how many pistons in the engine, ignition sequences, lubrication, etc.). To access each of these functions in any piston engine object, a programmer would call the same functions with the same names, but each type of piston engine may have different/overriding implementations of functions behind the same name. This ability to hide different implementations of a function behind the same name is called polymorphism and it greatly simplifies communication among objects.

With the concepts of composition-relationship, encapsulation, inheritance and polymorphism, an object can represent just about anything in the real world. In fact, one's logical perception of the reality is the only limit on determining the kinds of things that can become objects in object-oriented software. Some typical categories are as follows:

- Objects can represent physical objects, such as automobiles in a traffic-flow simulation, electrical components in a circuit-design program, countries in an economics model, or aircraft in an air-traffic-control system.
- Objects can represent elements of the computer-user environment such as windows, menus or graphics objects.
- An object can represent an inventory, such as a personnel file or a table of the latitudes and longitudes of cities.
- An object can represent user-defined data types such as time, angles, and complex numbers, or points on the plane.

With this enormous capability of an object to represent just about any logically separable matters, OOP allows the software developer to design and implement a computer program that is a model of some aspects of reality, whether that reality is a physical entity, a process, a system, or a composition of matter. Since the object can represent anything, the software developer can create an object which can be used as a component in a larger software project in the future.

If 90% of a new OOP software program consists of proven, existing components made from preexisting reusable objects, then only the remaining 10% of the new software project has to be written and tested from scratch. Since 90% already came from an inventory of extensively tested reusable objects, the potential domain from which an error could originate is 10% of the program. As a result, OOP enables software developers to build objects out of other, previously built objects.

This process closely resembles complex machinery being built out of assemblies and sub-assemblies. OOP technology, therefore, makes software engineering more like hardware engineering in that software is built from existing components, which are available to the developer as objects. All this adds up to an improved quality of the software as well as an increased speed of its development.

Programming languages are beginning to fully support the OOP principles, such as encapsulation, inheritance, polymorphism, and composition-relationship. With the advent of the C++ language, many commercial software developers have embraced OOP. C++ is an OOP language that offers a fast, machine-executable code. Furthermore, C++ is suitable for both commercial-application and systems-programming projects. For now, C++ appears to be the most popular choice among many OOP programmers, but there is a host of other OOP languages, such as Smalltalk, Common Lisp Object System (CLOS), and Eiffel. Additionally, OOP capabilities are being added to more traditional popular computer programming languages such as Pascal.

The benefits of object classes can be summarized, as follows:

- Objects and their corresponding classes break down complex programming problems into many smaller, simpler problems.
- Encapsulation enforces data abstraction through the organization of data into small, independent objects that can communicate with each other. Encapsulation protects the data in an object from accidental damage, but allows other objects to interact with that data by calling the object's member functions and structures.
- Subclassing and inheritance make it possible to extend and modify objects through deriving new kinds of objects from the standard classes available in the system. Thus, new capabilities are created without having to start from scratch.
- Polymorphism and multiple inheritance make it possible for different programmers to mix and match characteristics of many different classes and create specialized objects that can still work with related objects in predictable ways.
- Class hierarchies and containment hierarchies provide a flexible mechanism for modeling real-world objects and the relationships among them.
- Libraries of reusable classes are useful in many situations, but they also have some limitations. For example:

- Complexity. In a complex system, the class hierarchies for related classes can become extremely confusing, with many dozens or even hundreds of classes.
- Flow of control. A program written with the aid of class libraries is still responsible for the flow of control (i.e., it must control the interactions among all the objects created from a particular library). The programmer has to decide which functions to call at what times for which kinds of objects.
- Duplication of effort. Although class libraries allow programmers to use and reuse many small pieces of code, each programmer puts those pieces together in a different way. Two different programmers can use the same set of class libraries to write two programs that do exactly the same thing but whose internal structure (i.e., design) may be quite different, depending on hundreds of small decisions each programmer makes along the way. Inevitably, similar pieces of code end up doing similar things in slightly different ways and do not work as well together as they should.

Class libraries are very flexible. As programs grow more complex, more programmers are forced to reinvent basic solutions to basic problems over and over again. A relatively new extension of the class library concept is to have a framework of class libraries. This framework is more complex and consists of significant collections of collaborating classes that capture both the small scale patterns and major mechanisms that implement the common requirements and design in a specific application domain. They were first developed to free application programmers from the chores involved in displaying menus, windows, dialog boxes, and other standard user interface elements for personal computers.

Frameworks also represent a change in the way programmers think about the interaction between the code they write and code written by others. In the early days of procedural programming, the programmer called libraries provided by the operating system to perform certain tasks, but basically the program executed down the page from start to finish, and the programmer was solely responsible for the flow

of control. This was appropriate for printing out paychecks, calculating a mathematical table, or solving other problems with a program that executed in just one way.

The development of graphical user interfaces began to turn this procedural programming arrangement inside out. These interfaces allow the user, rather than program logic, to drive the program and decide when certain actions should be performed. Today, most personal computer software accomplishes this by means of an event loop which monitors the mouse, keyboard, and other sources of external events and calls the appropriate parts of the programmer's code according to actions that the user performs. The programmer no longer determines the order in which events occur. Instead, a program is divided into separate pieces that are called at unpredictable times and in an unpredictable order. By relinquishing control in this way to users, the developer creates a program that is much easier to use. Nevertheless, individual pieces of the program written by the developer still call libraries provided by the operating system to accomplish certain tasks, and the programmer must still determine the flow of control within each piece after it's called by the event loop. Application code still "sits on top of" the system.

Even event loop programs require programmers to write a lot of code that should not need to be written separately for every application. The concept of an application framework carries the event loop concept further. Instead of dealing with all the nuts and bolts of constructing basic menus, windows, and dialog boxes and then making these things all work together, programmers using application frameworks start with working application code and basic user interface elements in place. Subsequently, they build from there by replacing some of the generic capabilities of the framework with the specific capabilities of the intended application.

Application frameworks reduce the total amount of code that a programmer has to write from scratch. However, because the framework is really a generic application that displays windows, supports copy and paste, and so on, the programmer can also

relinquish control to a greater degree than event loop programs permit. The framework code takes care of almost all event handling and flow of control, and the programmer's code is called only when the framework needs it (e.g., to create or manipulate a proprietary data structure).

A programmer writing a framework program not only relinquishes control to the user (as is also true for event loop programs), but also relinquishes the detailed flow of control within the program to the framework. This approach allows the creation of more complex systems that work together in interesting ways, as opposed to isolated programs, having custom code, being created over and over again for similar problems.

Thus, as is explained above, a framework basically is a collection of cooperating classes that make up a reusable design solution for a given problem domain. It typically includes objects that provide default behavior (e.g., for menus and windows), and programmers use it by inheriting some of that default behavior and overriding other behavior so that the framework calls application code at the appropriate times.

There are three main differences between frameworks and class libraries:

- Behavior versus protocol. Class libraries are essentially collections of behaviors that you can call when you want those individual behaviors in your program. A framework, on the other hand, provides not only behavior but also the protocol or set of rules that govern the ways in which behaviors can be combined, including rules for what a programmer is supposed to provide versus what the framework provides.
- Call versus override. With a class library, the code the programmer instantiates objects and calls their member functions. It's possible to instantiate and call objects in the same way with a framework (i.e., to treat the framework as a class library), but to take full advantage of a framework's reusable design, a programmer typically writes code that overrides and is

called by the framework. The framework manages the flow of control among its objects. Writing a program involves dividing responsibilities among the various pieces of software that are called by the framework rather than specifying how the different pieces should work together.

- Implementation versus design. With class libraries, programmers reuse only implementations, whereas with frameworks, they reuse design. A framework embodies the way a family of related programs or pieces of software work. It represents a generic design solution that can be adapted to a variety of specific problems in a given domain. For example, a single framework can embody the way a user interface works, even though two different user interfaces created with the same framework might solve quite different interface problems.

Thus, through the development of frameworks for solutions to various problems and programming tasks, significant reductions in the design and development effort for software can be achieved. A preferred embodiment of the invention utilizes HyperText Markup Language (HTML) to implement documents on the Internet together with a general-purpose secure communication protocol for a transport medium between the client and the Newco. HTTP or other protocols could be readily substituted for HTML without undue experimentation. Information on these products is available in T. Berners-Lee, D. Connoly, "RFC 1866: Hypertext Markup Language - 2.0" (Nov. 1995); and R. Fielding, H, Frystyk, T. Berners-Lee, J. Gettys and J.C. Mogul, "Hypertext Transfer Protocol -- HTTP/1.1: HTTP Working Group Internet Draft" (May 2, 1996). HTML is a simple data format used to create hypertext documents that are portable from one platform to another. HTML documents are SGML documents with generic semantics that are appropriate for representing information from a wide range of domains. HTML has been in use by the World-Wide Web global information initiative since 1990. HTML is an application of ISO Standard 8879; 1986 Information Processing Text and Office Systems; Standard Generalized Markup Language (SGML).

To date, Web development tools have been limited in their ability to create dynamic Web applications which span from client to server and interoperate with existing computing resources. Until recently, HTML has been the dominant technology used in development of Web-based solutions. However, HTML has proven to be inadequate in the following areas:

- Poor performance;
- Restricted user interface capabilities;
- Can only produce static Web pages;
- Lack of interoperability with existing applications and data; and
- Inability to scale.

Sun Microsystem's Java language solves many of the client-side problems by:

- Improving performance on the client side;
- Enabling the creation of dynamic, real-time Web applications; and
- Providing the ability to create a wide variety of user interface components.

With Java, developers can create robust User Interface (UI) components. Custom "widgets" (e.g., real-time stock tickers, animated icons, etc.) can be created, and client-side performance is improved. Unlike HTML, Java supports the notion of client-side validation, offloading appropriate processing onto the client for improved performance. Dynamic, real-time Web pages can be created. Using the above-mentioned custom UI components, dynamic Web pages can also be created.

Sun's Java language has emerged as an industry-recognized language for "programming the Internet." Sun defines Java as: "a simple, object-oriented, distributed, interpreted, robust, secure, architecture-neutral, portable, high-performance, multithreaded, dynamic, buzzword-compliant, general-purpose programming language. Java supports programming for the Internet in the form of platform-independent Java applets." Java applets are small, specialized applications that comply with Sun's Java Application Programming Interface (API) allowing developers to add "interactive content" to Web documents (e.g., simple animations,

page adornments, basic games, etc.). Applets execute within a Java-compatible browser (e.g., Netscape Navigator) by copying code from the server to client. From a language standpoint, Java's core feature set is based on C++. Sun's Java literature states that Java is basically, "C++ with extensions from Objective C for more dynamic method resolution."

Another technology that provides similar function to JAVA is provided by Microsoft and ActiveX Technologies, to give developers and Web designers wherewithal to build dynamic content for the Internet and personal computers. ActiveX includes tools for developing animation, 3-D virtual reality, video and other multimedia content. The tools use Internet standards, work on multiple platforms, and are being supported by over 100 companies. The group's building blocks are called ActiveX Controls, small, fast components that enable developers to embed parts of software in hypertext markup language (HTML) pages. ActiveX Controls work with a variety of programming languages including Microsoft Visual C++, Borland Delphi, Microsoft Visual Basic programming system and, in the future, Microsoft's development tool for Java, code named "Jakarta." ActiveX Technologies also includes ActiveX Server Framework, allowing developers to create server applications. One of ordinary skill in the art readily recognizes that ActiveX could be substituted for JAVA without undue experimentation to practice the invention.

Figure **3** is a flowchart illustrating a method **40** for performing a historical portfolio analysis, in accordance with one embodiment of the present invention. First, in operation **42**, a network is utilized to receive historical positions of one or more investments of a user. Then, a historical time series is obtained for each of the investments utilizing the network. See operation **44**. The historical positions of the investments of the user are then analyzed based on the historical time series to generate a historical analysis of the investments of the user as indicated in operation **46**. Finally, in operation **48**, the historical analysis is transmitted to the user utilizing the network.

In one embodiment of the present invention, the historical positions of the investments of the user are retrieved from a database. In another embodiment, the historical analysis of the investments includes a calculation of a mean at endpoints of the historical analysis.

In one aspect of the present invention, capital gains taxable exposure may be determined based on the historical analysis. Optionally, a compound growth factor may be determined based on the historical analysis. Also optionally, a Value at Risk may be determined based on the historical analysis utilizing a variance method computation. The Value at Risk may also be determined based on the historical analysis utilizing a covariance method computation.

It is not easy to determine how well a portfolio has performed. Typically, investors compare the closing valuation of one period against a previous period, say, one year or one quarter. So often investors may believe that they are up 60% over the previous year. However, this is seriously misleading. If, for example, the end of the end period value reflects a temporary upswing and the start period value represents a brief downturn, the overall growth pattern can be dramatically overestimated. There are many better approaches to portfolio valuation and marginal accuracy is typically gained by increased computational complexity. However, a simple, robust approach is to fit an exponential growth curve to the data.

It is intuitively obvious that the curve passes through the 'center' of the data. This makes it easy for the investor to interpret the curve as the 'signal' that underlies the 'noise.' The two end points of the plot are reasonable proxies for mean portfolio values at each point in time. The compound growth factor in the curve is a good proxy for realized compound growth. The calculation algorithm is simple and uncontroversial.

Of the various kinds of risk a private investor must face, market volatility is central. This can be measured in terms of the amount of fluctuation a security or portfolio exhibits around a measure of central tendency. Taking the growth curve as the central tendency, volatility risk can be characterized by the familiar two standard deviation bands representing 95% of measured variation.

The investor need not understand any of the math or the theory. This should be completely invisible. The simple idea is that the security or portfolio in question is likely to over- or under-perform the risk bands about 1 time in 20. For any moment in time, the investor can be shown that there has been 1 chance in 20 of portfolio gains being greater than X or losses greater than Y.

The three lines representing central tendency and upper/lower confidence intervals are easy to understand and interpret on the fly. Absolute risk can be measured by expressing standard deviation as a fraction of the central tendency. This can easily be presented on a scale. Relative risk can be measured by comparing this statistic to similar ones for indexes like the DOW, S&P. etc. Table 1 below illustrates an exemplary historical portfolio analysis in accordance with one embodiment of the present invention.

Investor's Basic Issues	System Calculates	Comments
How can I get a snapshot of my portfolio growth?	Growth curve with graphical display	The graphic shows the mean estimated initial value of the portfolio, the mean estimated final value and the growth curve connecting them
What was my portfolio worth at the *beginning* of the period?	Starting mean estimated portfolio valuation	Portfolio fluctuations make it hard to distinguish signal from noise. The growth curve runs right down the central axis of the volatility movements. Its end points represent estimated mean initial and current values
What was my portfolio worth at the *end* of the period?	Ending mean estimated portfolio valuation	(See above)
What kind of growth have I been achieving with my current investment strategy?	Compound growth factor	Current strategy includes choice of securities as well as timing and volume of investment. Historical growth factor includes growth due to both market changes and investor capital flows. It is calculated as a gross geometric average percentage change per period
Is there some way of measuring my risk exposure?	Value at Risk	"On average, you have been exposed to a 5% chance of losing $8000 on any given trading day." Computation to use variance/covariance method in a historical simulation
How do I know whether this level of risk is high or low?	VaR compare to VaR of user selected benchmark indexes and/or securities	
How does my portfolio reflect changes in the market?	Beta relative to chosen benchmarks	"Your portfolio tends to track strongly in the same direction as the NASDAQ 500, but its upward and downward movements are more extreme. You have recently tracked in a direction opposite to the DOW."
Which of the securities in my portfolio are the strong contributors to overall growth?	Net present contribution of each security to current growth	A list of strong and weak performers: a breakout of securities by compound growth
How does each security contribute to overall risk?	Beta analysis of equities and mutual funds relative to portfolio. Equivalent analysis for bonds	"Stock X is quite volatile, but tends to move in a direction opposite to the rest of your portfolio. For this reason, it tends to reduce overall risk."
What is my return on investment?	ROI: ◆ Based on gross cumulative investment ◆ Compared to equivalent cash flows into riskless Gov't. Bonds ◆ Net yield compared to riskless bonds	In a historical portfolio investors can find it hard to discriminate between the performance of the underlying securities and the impact of moving moneys in and out. This analysis calculates growth net of investment flows. It compares portfolio growth to the net present value of the cash flows at the beginning of the period in question. They are also compared to equivalent flows into a riskless bond. And the difference between actual and riskless gains is calculated. This allows calculation of the risk premium
How are the different sectors of my portfolio contributing to growth and risk?	Yield and volatility breakdown by sector	
What is my tax exposure?	Capital gains and other taxable exposure	

Table 1

Figure **4** is a flowchart illustrating a method **50** for performing a current portfolio analysis, in accordance with one embodiment of the present invention. In operation **52**, current positions of one or more investments of a user are received via a network. Then, in operation **54**, the network is utilized to obtain a historical time series for each of the investments. A current analysis of the investments of the user is then generated based on an analysis of the current positions of the investments of the user and the historical time series as indicated in operation **56**. Finally, the current analysis is transmitted to the user utilizing the network. See operation **58**.

In one embodiment of the present invention, the current positions of the investments of the user may be retrieved from a database. In another embodiment, the current analysis of the investments includes a calculation of a mean at endpoints of the current analysis. In yet a further embodiment, the current positions may be back tested over a predetermined time period.

In one aspect of the present invention, a Value at Risk may be determined based on the current analysis utilizing a variance method computation. Optionally, a Beta may be determined relative to selected benchmarks for the current positions.

An efficient portfolio can deliver a required level of growth for the least possible risk. Two ways to achieve this are to rebalance a portfolio to favor lower risk stocks which deliver appropriate growth, if they exist. Another is to favor securities with appropriate growth whose volatilities move typically in opposite directions to the portfolio.

To manage risk in this way, the present invention provides the investor with two needed capabilities: a filter to identify candidate securities, and a tool to quantify the risk/reward impact of a given security transaction on the portfolio. Table 2 below illustrates an exemplary current portfolio analysis in accordance with one embodiment of the present invention.

Investor's Basic Issues	System Calculates	Comments
How can I get a snapshot of my portfolio growth?	Back test current portfolio over required period. Develop compound growth coefficient	Growth curve would be calculated, but not displayed. It would be used to develop the compound growth factor as well as the estimated current mean valuation
What is my portfolio worth now?	Ending mean estimated portfolio valuation	(See above)
Is there some way of measuring my risk exposure?	Value at Risk (VaR)	"On average, you are now been exposed to a 5% chance of losing $8000 on any given trading day." Computation to use variance/covariance method in a back-tested historical simulation of current positions
How do I know whether this level of risk is high or low?	VaR compare to VaR of user selected benchmark indexes and/or securities	
How does my portfolio reflect changes in the market?	Beta relative to chosen benchmarks	"Your portfolio may trend to track strongly in the same direction as the NASDAQ 500, but its upward and downward movements are more extreme. You may track in a direction opposite to the DOW."
Which of the securities in my portfolio are the strong contributors to overall growth?	Net present contribution of each security to current growth	A list of strong and weak performers: a breakout of securities by compound growth
How does each security contribute to overall risk?	Beta analysis of equities and mutual funds relative to portfolio. Equivalent analysis for bonds	"Stock X is quite volatile, but tends to move in a direction opposite to the rest of your portfolio. For this reason, it tends to reduce overall risk."
How are the different sectors of my portfolio contributing to growth and risk?	Yield and volatility breakdown by sector	
How does my historical portfolio performance compare to expected performance of my current portfolio?	Comparison and contrast of volatility compound growth, etc., variously broken down	

Table 2

Figure **5** is a flowchart illustrating a method **60** for performing a current trade impact analysis, in accordance with one embodiment of the present invention. First, in operation **62**, current positions of one or more investments of a user are received via a network. Next, in operation **64**, the investments are filtered based on selected

securities characteristics. A current trade impact analysis is then generated based on an impact of a trade on selected portfolio characteristics of the current positions. See operation **66**. Finally, in operation **68**, the current trade impact analysis is transmitted to the user utilizing the network.

In one embodiment of the present invention, the selected securities characteristics include a growth coefficient. Optionally, the selected securities characteristics may include a correlation to selected indexes to overall portfolio. Also optionally, the selected securities characteristics may include a ratio of sigma to mean portfolio valuation.

In one aspect of the present invention, the selected portfolio characteristics may include portfolio growth. Additionally, the selected portfolio characteristics may include Value at Risk. Further, the selected portfolio characteristics may include a Beta. . Table 3 below illustrates an exemplary current trade impact analysis in accordance with one embodiment of the present invention.

Investor's Basic Issues	System Calculates	Comments
How will a change in my positions impact risk and reward?	Growth, VaR and volatility impact of each proposed trade, both absolute and relative to user-selected benchmarks	Once the starting portfolio has been aggregated, it can be treated as a single security. The proposed trade, therefore, entails a simple, two-element variance/covariance analysis
How do I know which securities to use for a desired risk/reward impact?	System filters list of securities based factors including: 1. positive Beta to portfolio (increased risk) 2. negative Beta (decreased risk) 3. compound growth coefficient	Modern Portfolio Theory emphasizes that two volatile stocks within a portfolio can offset each other's volatility if they typically move in opposite directions. This hedging strategy has been difficult for retail investors. This will be the first commercial filter to emphasize not just the magnitude of a security's Beta but its direction compared to the Beta of the portfolio

Table 3

Figure **6** is a flowchart showing a method **70** for forecasting and stress testing in accordance with one embodiment of the present invention. In operation **72**, current positions of one or more investments of a user are obtained via a network. Then, in operation **74**, the investments are filtered based on selected securities characteristics. A forecast and stress analysis is then generated based on selected portfolio characteristics of the current positions as indicated in operation **76**. Finally, in operation **78**, the forecast and stress analysis is transmitted to the user utilizing the network.

In one embodiment of the present invention, the forecast and stress analysis is generated by projecting a current value of the current positions forward using a compound growth factor. Optionally, the forecast and stress analysis may be generated by projecting a current value of the current positions forward using a volatility from a historical portfolio analysis. Also optionally, the forecast and stress analysis may be generated by applying compound growth and volatility using back-tested parameters to determine a future portfolio value.

In one aspect of the present invention, the forecast and stress analysis is generated by representing growth as an annuity with regular contributions to determine a further portfolio value. Additionally, a future portfolio value when future markets are different from past markets may be determined.

Given the current value, growth factor and standard deviation of the current portfolio, it is possible to project a value for any time in the reasonable near future. This can be presented graphically and alphanumerically. However, this is only valid assuming that both underlying market conditions and business performance of public firms do not significantly change.

There are two ways to couch this forecast in a more realistic perspective: use the Algorithmics' Mark-to-Future calculations to test against detailed scenarios and regimes using Monte Carlo Simulation and values from the "Cube." Pick a few of

the bearish scenarios currently considered by analysts: emergent inflation, divergence of old and new economies, etc., and model their impacts in selected stress tests. Table 4 below illustrates an exemplary forecasting and stress testing analysis in accordance with one embodiment of the present invention.

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Investor's Basic Issues	System Calculates	Comments
What will my portfolio be worth if I continue my current pattern of investment activities?	System projects current value of portfolio forward using the compound growth factor and volatility from historical portfolio analysis. It also calculates best and worst case using 95% confidence intervals.	The investor's historical pattern of activities include: 1. Timing and selection of trades 2. Frequency of trades 3. Rate of investment into the portfolio 4. Performance of selected securities in the market 5. Cost of trades Growth and volatility calculations for the historical portfolio will be impacted by all of these. So the forecast based on history will test the performance of the entire combination of factors
What would my portfolio be worth if I: **1. let it alone** **2. grew it evenly by a regular monthly amount**	These projection would be based on back-tested parameters of the current portfolio. This would filter out the effect of: 1. Trading frequency 2. Cost of trades 3. Capital inflows/outflows The first question is answered by applying compound growth and volatility using the back-tested parameters. The second is answered by treating growth as an annuity with regular contributions	Many investors achieve less than optimal results by over-trading. They buy high and sell low, reacting to the morning news on impulse. They also lower their profitability through bloated trading costs. These two calculations allows the investor to compare the previous forecasts which include their trading practices to the current forecasts which do not. The second forecast treats their current portfolio as if it were a mutual fund in which they were dollar cost averaging.
What if future markets are different from the past?	Stress-test calculations could model some simple scenarios which would affect the entire portfolio: 1. One or more serious corrections at random times during the forecast interval 2. Long-term declines in overall compound growth 3. Combinations of the above The scenarios could be based on the fears and concerns that are current in the market at any given moment. For example, current fears include: 1. An inflationary cycle of unknown duration 2. A long-term divergence of old and new economy stocks 3. A collapse of over-valued Internet stocks 4. Etc. If Algorithmics methodologies were available, this is where a Mark-to-Future model would be useful	Most investment advisors are reluctant to provide forecasts based on historical growth for well-known reasons. Each of the forecasts in the rows above assume the future will unfold like the past. These stress tests are designed to create the appropriate sense of caution in the investor's mind.

Table 4

Additional exemplary implementation details will now be set forth. Figure **7** illustrates how the present invention serves as a value-added layer for managing and coordinating advisory and transactional service. Traditional private bankers **150** have hands-on responsibility for a personalized administration-intensive experience. There are few economies of scale and under-use of enabling technologies. In the virtual private bank, private bankers are relationship managers, customer coaches, consultative sales representatives, high-level problem solvers and gateways to specialist resources with deep product expertise. They are highly leveraged through workflow, communication and knowledge-rich technologies.

Next wave banking is conducted within the framework of a Service Level Agreement negotiated between the customer and Private Banker.

The Service Level Agreement:
allows the customer to tailor an explicit understanding about how much and what kinds of service will be needed to meet needs and satisfy interaction preferences
allows the Private Banker to match a service package to expected customer profitability
establishes the basis for service fees, if any
sets a service quality standard against which the Private Banker must deliver

Terms of the agreement include:

how personal information will be shared and used
how much administration will be off-loaded to the Private Banker
how much modeling and advice will be required
how much management of external and internal primary advisors will be needed
how day-to-day communications will be handled
how third-party product brokerage will be managed

The client's trust to disclose a complete account of personal net worth is necessary to reap the fullest rewards of the relationship. The LifePath Model is where most of the disclosure is focused. It is a lifetime cash flow projection based on a consolidation of income and expense streams. Unlike the cumbersome financial plan, the model is meant to quickly snapshot the customers' sense of how they see a risk-free ideal life unfolding. The model permits the customer to identify potential problems and opportunities, allows the Private Banker to estimate long-term customer profitability and iterate the Service Level Agreement to the appropriate level. Discussions triggered by the LifePath Model lead to immediate and longer term product sales. The data in the LifePath Model feed the various coaching engines with required client profiles. Product sales and other changes within the system feed automatically into the LifePath Model. External transactions need to be updated reliably by the customer. When the risk-free model is complete, the customer can model risks using a kind of Monte Carlo Simulation. Each iteration generates random risk impacts on the model using actuarial statistics for the customer. Modeled risks include disability, death, divorce, market downturns and other predictably unpredictable events. The point of the exercise is to explore risk exposure as it might occur and to allow the customer to make trade-off decision about risk management versus return.

Executive activities include Learn, Plan, Decide, Monitor, Manage and Transact. Each of these is supported by coaching and modeling capabilities which feed from data in the LifePath Model.

Figure **8** illustrates one particular embodiment of a financial management information system for providing personalized financial advice in a collaborative computing environment between a user and a dedicated financial advisor. Referring to Figure **8**, financial management system **210** comprises a service level subsystem **212** configured to operate with an advice generating subsystem **216**. Service level subsystem **212** includes a personalized service level agreement **214** that is negotiated by the user. Service level agreement **214** defines the user's desired level of advisor

support. For example, a user can negotiate a service level agreement **214** where the system and/or advisor will provide a minimum level of support or the system will provide advice only on specified topics. On the other hand, the system can optionally provide new levels of support even if the user only wants low-level system and/or advisor support.

Similarly, service level agreement **214** can also limit the system's and/or advisor's access to the user's financial information. In one possible embodiment of the invention, the user can optionally input detailed information about their finances into the system. However, the user may wish to limit the system's and/or advisor's access to that information when generating or providing advice. The user can increase the system's access to information as the relationship between the user and the system develops into a trusting and secure relationship.

The advice generating subsystem **216** includes one or more advice engines **218**. Each advice engine **218** is capable of dynamically analyzing the user's financial needs in accordance with the negotiated service level agreement **214**. In so doing, advice generating subsystem **216** provides the user with customized advice tailored to the user's life intentions.

The user interacts with financial management system **210** through collaborative computing environment **219**. In one embodiment, collaborative computing environment **219** comprises a user workstation **220** in communication with an advisor workstation **222** through communications network **224**. User terminal **220** is typically a personal computer that may be linked to communications network **224** using a modem, network, or other communication device. Additionally, financial management system **210** maintains a personalized website for the user. The personalized website provides an interactive interface between the user, the financial advisor and financial management system **210**. Furthermore, the personalized website allows users to assume an executive decision-making role with respect to their financial lives. For example, by working with the interactive personalized

website, the user is able to learn, plan, decide, transact and monitor their financial life from an executive perspective in accordance with the level of support specified in the service level agreement.

Additionally, the user can interact with a dedicated financial advisor operating at advisor terminal **222**. In one possible embodiment, the dedicated financial advisor communicates with the user via still images and streaming voice data through communications network **224**. Alternatively, the dedicated financial advisor can communicate with the user via streaming video data through communications network **224**. In another embodiment of the invention, the user can communicate with the dedicated financial advisor using a telephone (not shown) or via electronic mail (not shown).

Furthermore, user terminal **220** typically has a resident operating system such as Microsoft Windows®, Windows NT®, IBM OS/2®, or Unix®. Furthermore, in one embodiment, user terminal **220** has Internet browser software installed, for example, Microsoft Intranet Explorer® or Netscape Navigator®.

It should be noted that various computing platforms can be used to access the financial management system of the present invention. For example, a networked personal computer environment, a client-server system, a mainframe terminal environment, WEB TV terminal environment, dumb terminal environments can be used to access the financial management system of present invention. Depending upon the user's needs, a client-server system may be the most preferable computing system for implementing the financial system of the present invention.

Figure **9** shows a possible embodiment for the system architecture supporting financial management system **210**. User terminal **220** allows the user to access the system architecture **341** through a communications network **224**. In one embodiment, communications network **224** is the Internet. System architecture **341** comprises various logical devices that may be used to run the financial management

system **210**. In one embodiment, the logical devices are in communication with one another through a local area network ("LAN") **354**.

As shown in Figure **9**, system architecture **341** connects to communications network **224** through firewall server **342**. Firewall server **342** secures the system architecture **341** and the data and application software residing on the various servers. Web server **346** provides the web server software and related HTML documents for the collaborative computing environment of the present invention. Application server **350** is the transaction server and stores the application code for the financial management information system. Additionally, gateway/mail server **344** allows the system architecture to receive electronic messages from users that can be passed on to the user's financial advisors.

Figure **10** shows a more detailed diagram of the several subsystems and modules of financial management system **210**. A user terminal **220** is used to input user financial information into financial management system **210**. For example, user terminal **220** is used to input the user's life intentions data **464** into financial management system **210**. Similarly, user terminal **220** can be used to interface with the service level subsystem **212** to negotiate a service level agreement **214**. Service level agreement **214** controls how financial management system **210** will use and access life intentions database **464**. Service level agreement **214** also controls the level of support financial management system **210** will provide to the user.

Life path model **462** maintains an interactive dialog between the user and financial management system **210**. Life path model **462** integrates the financial information available about the user in accordance with the user's service level agreement **214** to create an aggregate forecast of cash flow over the user's lifetime. The financial information available about the user includes the user's life intentions data **464** and the user's external financial data **466**.

In one embodiment of the invention, the user's life intentions data **464** includes information about the user's revenue and expenses. Similarly, the user's external financial data **466** includes the financial data stored on external systems. For example, external financial data **466** can include current checking account information from the user's bank or data related to the user's 401K plan. By incorporating external data **466** into the life path model **562**, the system is capable of dynamically analyzing the financial needs of the user and providing the user with an understanding of their financial health at any point with minimal input from the user. As discussed above, personalized services level agreement **214** can optionally allow the user to limit the system's and/or advisor's access to the user's external financial data **466**.

Additionally, life path model **462** also integrates external market data **468** into the aggregated forecast of the user's cash flow. In one embodiment of the present invention, external market data **468** includes information such as current mortgage interest rates or market inflation rates.

Advice generating subsystem **216** comprises one or more advice engines **218**. Advice engine **218** dynamically analyzes the financial needs of the user in accordance with the user's service level agreement. Furthermore, the advice engine **218** is configured to operate with rules repository **469**. Rules repository **469** is a collection of rules-based business logic that produces clear automated advice. Rules repository **469** generates its advice using life path data **465** and user insight data **467**. In one embodiment of the invention, user insight data **467** includes transaction history, product or purchase history, as well as demographic information about the user.

In addition to providing sound advice to the user, advice generating subsystem **216** also recommends product solutions to the user. In one possible embodiment of the present invention, advice engine **218** can recommend that the user include deposit products and loan products in their financial plan. For example, the advice engine

218 can recommend that the user acquire a certain mortgage or bridge financing. Similarly, the advice engine **218** can also recommend consumer, home improvement, line of credit, or credit card products. Advice engine **218** can also have access to product information from various financial institutions (not shown). Accordingly, the user can request additional information about the various products recommended by the system.

The user can access their financial plan or life path model using user terminal **220**. User terminal **220** is part of collaborative computing environment **219** and is in data communication with virtual coach **270** and the advisor terminal **222** through communications network **224**. In one embodiment of the present invention, communication network **224** is the Internet.

The advice and product solutions generated by the advice generating subsystem **216** are presented to the user through virtual coach **470**. Virtual coach **470** presents the product recommendation with accompanying rationale and is discussed in further detail in conjunction with Figure **14**. The user may or may not wish to contact the dedicated financial advisor for additional advice or information. Because the system generates reasoned financial advice in accordance with the user's financial needs and intentions, the financial advisor is able to operate more productively. Furthermore, the user can test different scenarios by altering the data captured by life path model **462**. Each scenario can then be analyzed by advice engine **218**.

In addition to virtual coach **470**, the user can optionally interact with a dedicated financial advisor **222** through communications network **224**. In one embodiment of the present invention, financial advisor **222** is located in a call center. Financial advisor **222** can interact with user **420** using various multimedia interaction tools, for example, still-shot images or video streaming. Accordingly, the user is able to buttress the advice received from virtual coach **470** with advice from a dedicated financial advisor operating at terminal **222**.

Figure **11** is a detailed block diagram of the modules and data structures relating to the life path model **462**. As discussed above, life path model **462** is a dynamic and interactive computing environment for integrating the components of a user's financial life into a strategic model. In one embodiment of the present invention, life path model **462** comprises an intentions profile subsystem **464** and an aggregated modeling module **584**. Intentions profile subsystem **464** allows the life path model **462** to capture the user's life intentions. In one embodiment of the present invention, the user's life intentions are expressed as revenue intentions **580** and expense intentions **582**.

Revenue intentions **580** represents a summary of the user's income information. For example, revenue intentions **580** can include salary, investment, pension, alimony, or other sources of income information that may be relevant to the user's financial life. Similarly, expense intentions **582** represents a summary of the user's expense information. For example, the user's expense information can include housing, transportation, education, health care, or other sources of expense information relevant to the user's financial life. A more detailed discussion of the methods used to capture the user's life intentions will be discussed below in relation to Figure **16C**.

Aggregated modeling module **584** analyzes various information about the user and constructs a strategic model of the user's financial life. In one embodiment of the present invention, aggregated modeling module **584** is configured to operate with intentions profile subsystem **464** and receives as input data the user's revenue intentions data **580** and expense intentions data **582**. Furthermore, aggregated modeling module **584** also receives as input data user financial data 66 and external market data **468**.

User financial data **466** includes static financial data about the user as well as dynamic financial information about the user. Static financial data is typically data provided by the user that seldom changes such as the value of the user's home.

Dynamic financial data stored on third-party computing systems separate from the financial management system of the present invention. Thus, aggregated modeling module **584** has access to the user's most current financial information. Therefore, instead of simply using static financial information, aggregated modeling module **584** also incorporates the user's dynamic financial information and is thus able to provide the user with a more accurate strategic model.

In one possible embodiment of the invention, user financial information 66 is account information from one or more of the user's checking accounts maintained by third-party financial institutions. Similarly, user financial information 66 can also include information relating to one or more of the user's individual retirement accounts or other investment data being maintained by third-party financial institutions.

The user can control the level of access the financial management system of the present invention has to their financial data stored on third-party computing systems through the negotiated service level agreement **214**. For example, the user may simply indicate that they have financial accounts at various institutions without granting the system permission to access that information. However, as the user becomes more comfortable and trusting with the system, the user will increase the level of access the system has to such information.

As shown in Figure **12**, aggregated modeling module **584** is also coupled to a risk modeling module **586** that assists the user in understanding their exposure to financial risk illustrating how their ideal financial model would be impacted by a typical life crisis. Risk modeling module **586** is a dynamic and interactive computing environment that allows the user to select various risk events to incorporate into their life path model. The risk events include various life events that may affect the user's life path. For example, the user can request that the model include job loss, disability, casualty, market down turn, or other personal risk factors.

Additionally, risk modeling module **586** also considers actuarial data **588** as well as user interaction data **590**. Actuarial data **588** is data compiled relating to the statistical probability or likelihood that certain events might occur. Therefore, risk modeling module **586** can incorporate into the user's financial model risk events according to their statistical probability given basic information about the user, such as age, sex, race, or other similar factors.

In one possible embodiment of the present invention, the life path model can be repeated as often as the user desires. As the life path model is executed along with the risk modeling module, the user is presented with varying outcomes and scenarios for their life path model. Accordingly, the user's interaction with the risk modeling module fosters an intuitive understanding of exposure to financial risk and the variables affecting their financial trade-off decisions.

As discussed above, life path model **462** provides a dynamic and interactive interface to the user for capturing information about the user. Accordingly, the interface allows the user to learn how various factors may affect a person's financial health by simply changing a variable and allowing the aggregated modeling module to construct a new model of the user's financial life.

The LifePath Model is the hub of the Private Banker relationship. It is what provides data to the all the coaching engines, allowing the outputs to be tailored to a market of one. It is what allows the Private Banker to view the customer as a Whole Financial Person.

The power of the LifePath Model derives from the customers comfort with full disclosure and discipline about updating third party transactions and activities. It is the job of the Private Banker to impress the overwhelming benefits of this kind of commitment. However, the Service Level Agreement may stipulate less than full disclosure and less than a complete spectrum of possible services. In these cases, the

underlying logic of the LifePath Model and all coaching engines dependent on it should provide as much value-added interpretation as possible, subtly suggesting how much more could be provided with more trust and disclosure.

Part of what makes the LifePath Model unique is the interface used to plot time series for revenue and expenses. Each is represented as a timeline between any two defined dates and each annual point of timeline can be interactively dragged up or down on its vertical axis. This device makes it easy to estimate changes and rough in long stretches of time without the tedium of conventional spreadsheet data entry. The interactive data entry process can iterate as needed until the model is as complete as possible.

Some of the data feeding the LifePath Model is external. This could include market data about prices and costs as well as information about the customer captured in pre-existing or third-party banking activities.

The aggregated model highlights stretches of time during which cash flow is negative. These can be the typical starting points for a discussion between Private Banker and customer. The Private Banker demonstrates value early in the relationship by addressing these rough spots innovatively.

Running the risk model could show, for example, that the customer will be unable to educate children if there is even a short disability crisis in the preceding years. There are many possible solutions for this. The risk model is what positions and frames these discussions. And each iteration of the model generated an interpretation from the virtual coach.

The risk engine could model more than one random risk events occurring, such as disability and divorce. The customer may or may not decide that some are too unlikely to deserve expensive hedging.

Figure **11** is a detailed diagram showing the data and processes relating to the advice engine **218**. Advice engine **218** is comprised of an input section **691**, a processing section **592** and an output section **693**. Input section **691** comprises the typical input information that is supplied to advice engine **218**. For example, input section **691** includes life path model data **464**, user financial information **466**, external market data **468**, as well as user interaction data **490**. Life path model data **465** is the output data from life path model **462**. User financial information **466** includes static financial information provided by the user as well as dynamic financial information maintained by third-party financial institutions. External market data **468** includes market data relating to the product choices available to the user. User interaction **590** includes information gathered based upon the user's interaction with the system.

Processing section **692** illustrates the typical processing modules required for advice engine **218**. In one embodiment of the invention, advice engine **218** configures and optimizes **694** the features of products available to the user. Similarly, processing section **692** performs the calculations relating to the potential products available to the user in accordance with the input data summarized in input section **691**. Furthermore, processing section **692** includes a regulatory requirements module **696** that provides the necessary processing to ensure that the advice generated by the advice engine **218** complies with applicable government regulations.

Output section **693** includes the typical output elements from the advice engine **218**. For example, the advice engine can provide coaching advice **697** which provides the user with reasoned financial advice and product recommendations. Product configuration **698** provides the user with a product recommendation in addition to the specific product information tailored to the user's needs. Similarly, the output section **693** can assess the life path impact **699** to the user's financial health.

Figure **13** is a logical flowchart of a financial management system. In one embodiment of the present invention, the user first negotiates a service level agreement **700** before accessing the system. As discussed above, the service level

agreement defines the user's desired level of advisor support and further limits the system's access to user provided information. After the service level agreement has been negotiated **700**, the user can begin an initial pass with the life path model **702**. The life path model maintains a dialog between the user and the system and further resolves the user's life financial intentions into an aggregated forecast of cash flow. The life path model also estimates the probable profitability **704** of the user's financial plan given the user's intentions and other financial information. If the user's service level agreement matches the probable profitability **706**, the user can begin to fine tune their life path model **710**. Otherwise, the user can revisit and modify their service level agreement **708** and prompt the system to estimate the probable user profitability **704** again.

After fine tuning the life path model **710**, the system will generate computer based advice **712**. In one embodiment of the present invention, the user also may interact with a dedicated human financial advisor. Based upon the advice provided by either the computer based advice engine or the dedicated financial advisor **712**, the user can decide whether the life path model is acceptable **714**. If the life path is not acceptable to the user **714**, the user can adjust and fine tune the life path model **710**. Otherwise, the life path process is completed.

In one embodiment of the present invention, the life path model process provides the user with a personalized integrated summary of financial health. The system further allows the user to assume an executive decision-making role in making their financial decisions. The executive activity process **716** enhances the user's ability to manage his or her financial life from an executive perspective. For example, through interaction with the system, the user learns **718**, plans **720**, or decides **722** the respective elements of their financial plan. After engaging in these activities, the user can choose to initiate a transaction **724** based upon the advice generated by the system. Furthermore, after initiating a transaction **724**, the user can monitor **726** the status of the products selected.

Online, real time coaching is a major dimension of Next Wave banking. Coaching is done in a rules- based "if-then-else" structure which models a distinct domain of financial services. While many modelers produce numerical output, these coaches output syntactically and semantically correct natural English.

The distinction between coaching and advice is critical. Advice recommends specific buy/sell activities. No computer-generated logic should be trusted to do this. There cannot be a machine which eliminates the need for human judgment, experience, empathy and innovation in the solution of personal financial problems. Coaching, on the other hand, never gives the answer or recommends and action. Rather it alerts the customer to issues which need to be addressed, frames decisions which need to be made, signals customers and Private Bankers when certain strategic conditions obtain. On the one hand, it reduces the load on the Private Banker to provide this type of support and leverages the Private Banker's time to service a large customer base, on the other, it triggers communication between customer and advisor to provide just the kind of fine, discretionary intervention which cultivates trust and ongoing business.

Three factors make the virtual coach effective in FSI:

•Financial products can be easily modeled using "if-then-else" logic.
•Finance lends itself to statistical, formulaic and algorithmic modeling
•Legislative compliance issues can be formulated logically

Figure **14** is a logical flowchart of the process followed by the life path model **462**. Initially, the user typically develops **840** their life path model by inputting their life intentions. As discussed earlier, the life intentions are expressed as revenue intentions **580** as well as expense intentions **582**. After developing the life path model **840**, the aggregated modeling module is executed **841**. The user can verify that the model produced by the aggregated modeling module is acceptable **842**. If the model is not acceptable, the user can return to revise their life intentions **840**.

Otherwise, if the model is acceptable, the user can execute the risk modeling module **586**. As discussed above, the risk modeling module assists the user in understanding their exposure to financial risk by illustrating how their ideal financial model would be impacted by a typical life crisis.

After the risk modeling module has been executed **843**, the user is provided with virtual coaching **844** as well as a time-line display **846** of their aggregated forecast of their cash flow. Once again, the user has the opportunity to verify that the model produced is acceptable **844**. If the model is not acceptable, the user can return to revise their life path model in accordance with their financial life intentions **840**. If the life path model produced is acceptable, the user can either exit the system **850** or initiate a transaction **852**.

In an exemplary embodiment of the present invention, illustrated in Figure **15**, the financial management system of the present invention effects an improved personal financial planning and management program incorporating means and/or methods of implementing, coordinating, supervising, analyzing, and reporting on investments in an array of assets and borrowings from a variety of credit facilities.

In this embodiment, a Home Owner's Preferred Equity (HOPE) account **910** is the central operating account through which all transactions are implemented, coordinated, controlled, analyzed and reported to the client. Through the HOPE account the client is provided with client reports updated on a real time basis, portfolio management and financial services, including personal financial planning services.

The core element of the system is a unique type of mortgage, referred to as a Home Owner's Preferred Equity (HOPE) Mortgage **912**, which is secured by one or more of the client's homes **914** and one or more other assets or asset accounts **916**. The system also includes liability accounts and credit facilities **918**.

The client's home(s) **914** is the primary source of collateral for the HOPE mortgage. The system provides the client the opportunity to make increased investments in his assets or asset accounts **916** instead of decreasing the principle of the mortgage **912**. The Net Equity Total (NET) **920** is equal to the difference between the sum of all assets **916** and the sum of all liabilities **918**, excluding the value of the client's home **914** and mortgage **912**. The NET and the home(s) as adjusted by their respective loan to value ratios are available to be used as collateral for the HOPE mortgage **912**. By allowing the client to invest monies that would be used to amortize a conventional mortgage into other assets the client can increase his investment income and net worth after payment of taxes.

Through the system of the invention the client can optimize the allocation of personal assets and liabilities to maximize his net worth over a period of time by endeavoring to maximize the value of the home or homes that can be acquired by an individual given a certain income level, maximize the net after-tax income on investments, maximize the savings for retirement and minimize and defer the payment of personal income taxes.

The following example, which compares a conventional mortgage to the mortgage in the system of the present invention, illustrates the economic impact of the system. Assume the following:

(1) both mortgages are for $100,000 for a term of 30 years at a fixed rate of 10% with equal monthly amortization payments;

(2) at the initiation of the mortgage, the client's sole asset is the amount required to make a down payment on his home and the client's sole source of initial income in his salary;

(3) a "pension account", such as a Keogh, SEP or 401(K) plan, and an illustrative asset, "insurance policy" both produce returns of 8% per annum compounded. No

taxes are payable on the "pension account," the "insurance policy" or earnings thereon until distributions are made. The amount invested each year in the pension account and the insurance policy are equal to, respectively, the amount of the required amortization payment of the conventional mortgage and the tax savings generated by the system of the present invention;

(4) the taxes paid are based upon the taxes payable for the head of a household filing jointly with three dependents when TRA-86 is fully phased-in and there are only two tax brackets of 15% and 28% and a 5% tax surcharge for higher income tax payers;

(5) the home is assumed to appreciate at 4% per annum;

(6) the client's net worth is equal to the value of the home, the pension account, and the insurance policy less the amount of the outstanding mortgage;

(7) the client's annual income is initially $50,000 and increases by 5% each year.

TABLE 1

Year 1	Conventional Mortgage	System of the Present Invention
Gross Taxable Income	$50,000	$50,000
Interest Payments	$9,833	$10,000
Amortization Payments	$3,334	$0
Outstanding Loan Balance	$96,666	$100,000
Pension Account Investment		

	$0	$3,334
Pension Account Balance		
	$0	$3,467
Net Taxable Income	$40,167	$36,666
Taxes Paid	$4,375	$3,850
Net Income After Tax		
	$35,792	$32,816
Disposable Income	$32,458	$36,150
Tax Savings Invested In Insurance		
	$0	$500
Insurance Policy Balance		
	$0	$521
Market Value of Home		
	$120,000	$120,000
Total Disposable Income		
	$32,458	$36,150
Net Worth	$23,334	$23,988

Table 1 is illustrative of the client's financial statement for the first year under a conventional mortgage and under the system of this particular embodiment of the present invention.

In accordance with the present invention, the $3,334 that would otherwise be used annually to amortize the mortgage is instead contributed to a pension account which is not taxed in that year. Thus the client's net taxable income is $36,666 as opposed to the $40,167 when the $3,334 is realized as personal income and used to amortize the mortgage. Correspondingly, the taxes paid are lower and the client's disposable income is greater. In addition, the tax savings of $500 is invested in a tax favored

investment such as a single premium whole life insurance policy that yields a balance of $521 at year end.

TABLE 2

Year 2	Conventional Mortgage	System of the Present Invention
Gross Taxable Income	$52,500	$52,500
Interest Payments	$9,500	$10,000
Amortization Payments	$3,334	$0
Outstanding Loan Balance	93,332	$100,000
Pension Account Investment	$0	$3,334
Pension Account Balance	$0	$7,226
Net Taxable Income	$43,000	$39,166
Taxes Paid	$5,093	$4,225
Net Income After Tax	$37,908	$34,941
Disposable Income	$34,574	$38,275
Tax Savings Invested In Insurance	$0	$500
Insurance Policy Balance	$0	$1,048
Market Value of Home	$124,800	$124,800

Total Disposable Income	$67,031	$74,425
Net Worth	$31,468	$33,111

Referring to Table 2, in the second year the client gains the same benefits using the system of the present invention. The client now has an insurance investment balance of $1,048 and a pension account balance of $7,226.

TABLE 3

Totals After 30 Years	Conventional Mortgage	System of the Present Invention
Gross Taxable Income	$3,321,942	$3,321,942
Interest Payments	$149,971	$300,000
Amortization Payments	$100,000	
Outstanding Loan Balance	$0	$100,000
Pension Account Investment	$0	$100,000
Pension Account Balance	$0	$417,577
Net Taxable Income	$3,171,971	$2,921,922
Taxes Paid	$728,798	$650,563
Net Income After Tax		

	$2,443,173	$2,271,359
Disposable Income	$2,343,173	$2,371,379
Tax Savings Invested In Insurance		
	$0	$29,806
Insurance Policy Balance		
	$0	$109,023
Market Value of Home		
	$374,235	$374,235
Total Disposable Income		
	$2,343,173	$2,371,379
Net Worth	$374,238	$800,835

Referring to Table 3, over thirty years the client's total disposable income is $2,371,379 compared to a disposable income of $2,343,173 for a person in like circumstances who is paying off a 30 year conventional mortgage. The principal amount owed on the home is still $200,000. However, the client has accrued a pension account balance of $417,577 and an insurance policy balance of $109,023. The economic impact of the system is clearly realized by comparing the net worth of the client using the system of the present invention and that of a person who purchased a home by taking out a conventional mortgage. Through the system of the present invention the client may more than double his net worth.

The economic advantages of the system are proportionately dramatic for a client initially earning $100,000 a year, increasing 5% annually. Using the same assumptions stated in the example but with a mortgage for $200,000, the $6,667 that would be used annually to amortize the mortgage contributed to a pension account which is not taxed until distributions are made from the account after the client retires. As a result, the client accumulates $785,713 (including interest) in a pension or retirement account. In addition, the client accumulates an insurance policy

investment balance of $256,776. As a result, after 30 years of payments the client's total disposable income is $3,588,342, as opposed to a disposable income of $3,405,383 for a person making payments on a 30 year conventional mortgage, and his net worth is $1,599,965, which is more than double the $748,486 net worth of an individual under similar financial conditions after completion of payments on a 30 year conventional mortgage.

To implement such a system capable of producing these useful improvements in the planning and management of personal financial assets and credit facilities requires considerable change in the present methods for originating, administering, and servicing mortgages. The present invention details techniques for accomplishing these changes to provide individual consumers the ability to maximize the returns from the management of their personal financial resources while also providing appropriate security for the financial institution.

Table 4 illustrates the type of assets or asset accounts that a client may have within the system some of which may be collateralized to form additional security for the HOPE mortgage and into which funds that might ordinarily be used to amortize a conventional mortgage may be invested pursuant to the terms of the HOPE mortgage. The asset or asset accounts include insurance and annuities (I), pension and deferred compensation accounts (II), banking accounts (III), mutual funds (IV), brokerage accounts (V) and other assets and asset accounts (VI). Specific forms of each of these types of assets are enumerated in Table 4.

TABLE 4

HOPE ASSETS AND ASSET ACCOUNTS					
I	II				
Insurance					
	Pension and				
		III	IV	V	VI
and	Deferred	Banking	Mutual		

				Brokerage			
				Other			
	Annuities						
	Compensation						
5	Accounts	Funds	Accounts				
				Assets			
	Life	IRA	Checking	Money Market	Stocks	Trusts	
10	Health	401(K)	Savings	Equity			
				Bonds and			
				Other real			
				Fixed Property			
				Income			
15	Accident/						
	SEP	Other	Fixed	Options			
				Art and			
	Casualty		Income	Antiques			
	Annuities						
20	Keogh		Inter-				
			Commod-				
				Private			
			nation-				
			ity	Equity			
25			al	Futures			
				Holdings			
	Other	ESOP		Other	Other	Other	
	Other						

30

Table 5 lists several types of liabilities and credit facilities available through the HOPE account which include, but are not limited to, margin account borrowing, credit and debit cards, equity access loans and credit facilities, insurance and annuity policy loans, as well as other forms of liabilities and credit facilities. Specific forms of these liabilities and credit facilities are also set forth in Table 5.

TABLE 5

HOPE LIABILITIES AND CREDIT FACILITIES

IV
Insurance
I III and
Margin II Equity Access Annuity
Account
Credit and Loans and Credit
Policy V
Borrowing
Debit Cards
Facilities Loans Other

Against
Visa .TM. Equity Access Insurance
Student
Equity Loans and Credit
and Loans
Securities Annuity
Policy
Facilities
Loans
Against
MasterCard .TM.
Second Mortgage

Against
Pre-
Fixed Insurance
Existing
Income Policies
Debt
Securities
N.R.V. of
Diners Club .TM.
HOPE Loan secured
Against
Options by NET Annuities
Account
Other American HOPE Loan Secured
Other
Express .TM.
by Account Assets
Discover .TM.
Other
Other

The HOPE account provides the client the flexibility to maximize his financial performance and realize his financial objectives. Through the system of the invention financial services and products can be automatically received and dispensed within the HOPE account framework. For example, withdrawals, deposits and transfers may be made, securities, commodities and debt instruments may be purchased, sold and transferred in and out of the account, financial agreements such as insurance and annuity contracts and policies may be purchased or sold within the framework of the HOPE account, the agreements, contracts and policies purchased

may be transferred to safekeeping accounts monitored within the HOPE account system, a wide variety of different types of credit facilities and loans may be advanced to clients of the HOPE account and proceeds from credit facilities and loans received outside the framework of the HOPE account may be transferred to the account for use in the acquisition of other assets.

The system of the present invention can provide the client periodic account activity reports that clearly display the details with regard to each transaction conducted within the account such as a purchase and sale of securities, withdrawal or deposit of cash, acquisition of annuities, insurance policies and access to one or more types of credit facilities. The client's earnings can be categorized and summarized according to interest, dividends, asset disposition, or wages. Every transaction executed, for example, on a debit or credit card would be entered in the HOPE monthly account statement so that an accurate on-going list of expenses and the type of expenses will be presented automatically to the client at the end of every month and a detailed summary would be presented at year end for assistance in preparing personal tax returns.

The system of the invention also provides a client with a variety of standard accounting information which has commonly been used in a business environment but has seldom been appropriately applied to personal financial reporting. For example, the system may provide a client with sources and uses of funds statements, personal balance sheets indicating the market value of assets and liabilities in each category and illustrating the individual's net worth, a profit and loss report indicating net income for the period and year to date and an income and expense report comparing actual results to budgeted amounts.

Through the system of the invention the client can also access a host of ancillary investment news, information, advice, and counseling. In particular, a client can access a current news and information data base such as Dow Jones News Retrieval.TM., The Source.TM. and Compuserve.TM..

Clients of the HOPE account can also receive personal financial planning and analysis assistance by means of an interactive expert computer system and direct consultation with financial planners. The client may also receive accounting and tax preparation assistance through an interactive computer system with on-line expert computer software assistance with the opportunity to utilize certified public accountants. The client may also receive tax, estate and legal counseling advice through an interactive expert system that has full access to a data base such as LEXIS.TM. including all applicable tax code rules and regulations, ERISA regulations and applicable case law, etc.

Depending upon the number of HOPE client accounts and the complexity and size of each account, the system may be implemented on a microcomputer, minicomputer, mainframe computer or any combination of the three. Examples of such systems are the IBM Personal Computer AT manufactured by International Business Machines, the VAX series of minicomputers including the VAX 8700 manufactured by Digital Equipment Corporation, and IBM 3090 manufactured by International Business Machines.

The HOPE account system may comprise a central computer, which may be a minicomputer or mainframe connected to a plurality of terminal personal computers (PC) or minicomputers. The central computer stores the HOPE account information as well as processes and updates the HOPE account components. The personal computers or low-end minicomputers may be located at branch offices of the financial institution, at the desk of the HOPE account manager, HOPE account supervisor and at the home of the client. These computers may act as a terminal to the central computer to record and store reports issued by the system during processing and may perform local processing of information particular to the user of the personal computer. For example, the HOPE account manager may have a PC at his desk through which the manager can communicate with the central computer, receive client reports from the central computer and perform types of personal

financial planning and analysis on the HOPE account that need not typically be performed on the central computer.

The computer system comprises a Central Processing Unit (CPU), Random Access Memory (RAM), Read Only Memory (ROM), on-line and off-line storage and communication and input/output (I/O) ports.

The I/O ports provide the means for communications with the client, networks and other financial systems and services. For example, the system may connect to a network to access news or financial information such as stock prices, or communicate with a brokerage firm for the processing of a transaction. The client, through a terminal at the financial institution's office or through a personal computer with a modem located in the client's home, may communicate with the system to inquire about the status of his account, check news or financial information, or initiate a transaction.

Other banks, financial service institutions and insurance companies may communicate with the HOPE account's system in order to transfer asset and liability holdings or verify asset or liability holdings.

The client account information is stored in a database on the computer system. The system is not limited in the types of databases that can be utilized. The client data are organized in the database into four areas or files indexed according to HOPE account client numbers: general and personal information of the client, HOPE asset information, HOPE liability and credit account information, HOPE account balances, account limitations and constraints.

The HOPE general and personal information file contains personal information on each client such as name, home and work address, home and work telephone number and past credit history. The HOPE asset information file contains all the data regarding each client asset and asset account which is part of the HOPE account.

Each asset is described according to a variety of data including the type of asset, asset identifying information (e.g. policy numbers, bank and bank account number), how it can be accessed (e.g. bank or financial institution routing and transit numbers), the current value of the asset and projected future value of the asset.

The HOPE account liability and credit account file contains the type of information similar to the account asset file including the type of liability, identifying information on the liability, liability access, date of origination of the liability, the liability balance and the interest rate on the liability.

The HOPE account balance and account limitations files contain HOPE balance information such as asset totals, liability totals and account limitations such as minimum imposed balances, minimum imposed net cash flow, the imposed minimum HOME borrowing power (MIM) and financial ratios.

The data structure also allocates files for storage of system status reports that are issued during processing to the client and the financial institution departments and personnel. This information is stored for access and reference by the party to whom the information is reported. For example, a file is provided for each client for the storage of system reports issued to that client. The reports are then accessible only by that particular client. The HOPE account manager and supervisor may also have files allocated to them as well as the various departments e.g., the mortgage servicing department in the financial institution. These files, in a fully distributed system, may be located on the central computer or on the personal computers or minicomputers networked to the central computer.

Although the HOPE account is described comprising four main areas or files organized according to the HOPE client number, many other data structures may be realized within the scope of the present invention. For example, the data may be further distributed into a multiplicity of sub-files indexed according to predetermined data such as client number and type of asset, or the data may be

organized in a data structure that is less distributed.

As noted previously, the central element of the HOPE account system is the HOPE mortgage. Referring to Table 6 the HOPE mortgage can be described by various elemental categories including: forms of collateral, legal documentation and financial terms and conditions.

TABLE 6

HOPE MORTGAGE ELEMENTS		
I	II	III
Forms of Collateral	Legal Documentation	Financial Terms & Conditions
Home(s)	HOPE Mortgage Master Agreement	Minimum Principle Outstanding Balance
Insurance	Individual Secured	Required Interest
Annuities	Collateral Agreements	Payment
Pension and Deferred Compensation Plans	Cross-collateral-ization Agreements	Amortization Payment or Investment Alternative
Banking Accounts	Individual Asset Account Agreements	Fees & Expenses

Mutual Funds		
	Other	Term of Mortgage
Other		Other

The acceptable forms of collateral illustratively include: one or more homes which would be valued for purposes of collateralization at a percentage of their appraised fair market value, insurance and annuity policies valued for purposes of collateralization at their net fair market or cash redemption value, various forms of pension and deferred compensation plans and accounts valued for purposes of collateralization at their net fair market value, banking accounts including checking and savings accounts to be valued for purposes of collateralization at their net account balances, mutual funds to be valued for purposes of collateralization at the net fair market redemption value and other forms of alternate collateral.

The required legal documentation for the HOPE mortgage may include, but is not limited to, a HOPE mortgage agreement, individual security agreements for each of the various assets that are used as collateral for the HOPE mortgage, cross-collateralization agreements that allow the value of various asset and asset accounts to be used to support borrowings or indebtedness and individual asset or asset account agreements which include the contractual agreements establishing and setting forth the operations of the asset accounts.

The financial terms and conditions of the HOPE mortgage which are substantially new and different from those of conventional mortgages include: a continuous real time determination of the permissible outstanding balance of the mortgage which takes into consideration the value of all assets used to collateralize the mortgage; interest payments which can be either in the form of fixed, floating, or a combination of fixed and floating interest payments as determined by the client and

lending institution; the required amortization payments, if any, which may, in the preferred embodiment of the invention, constitute zero amortization payments in exchange for the client making alternative investments in assets or asset accounts of his choice; the term or life of the mortgage which would in many instances be of a term of 15 to 30 years but could be different dependent upon agreements reached by the lending institution the client; required fees and expenses for the initiation and continuation of the HOPE mortgage including origination fees, servicing fees, closing costs and prepayment penalties; and other terms and condition as may be required.

A HOPE Mortgage Origination Process is initiated when the HOPE client requests a HOPE mortgage. The HOPE mortgage application process illustrated assumes that the applicant (client), has access to the HOPE central computer through a computer terminal or terminal-emulating computer. A HOPE mortgage application menu and the HOPE mortgage master menu are presented to the client. These two menus include a number of chapters or sub-menus which closely resemble information that must be completed to originate a standard mortgage and others that are uniquely attributable to the HOPE mortgage.

The client reports his qualifications, including financial and employment background, assets owned, anticipated income, etc. This information is standard to almost all mortgage applications. Much of the data may be automatically inputted from the system data structure into his application insofar as within the system data structure the HOPE account data files already have information on all assets and liabilities, anticipated income, etc. from the establishment of his HOPE account.

A Priority Asset and Liability Allocation Process (PALAP) is then initiated. As will be explained below, PALAP utilizes a type of mathematical programming to perform personal financial planning and analysis and establish a system of priorities for the allocation of stocks (quantities) and flows of financial assets and liabilities for each HOPE client account. Through PALAP, the system generates for the client

a suggested Priority Asset and Liability Allocation Order (PALAO) which is the optimal PALAO for the client. Financial statements based on the recommended PALAO are provided to the client to illustrate the effect of the proposed financial plan. A client's PALAO provides the guidelines by which the financial institution governs, regulates and monitors the client account. Alternative PALAOs together with financial projections based upon those alternative PALAOs may be made available to the client for his review and subsequent selection during the remainder of the mortgage application process.

The client is then presented a menu from which the client may select his desired level of borrowing secured by his home or homes and one or more other assets. This level of borrowing may be of a declining amount over a period of time (i.e., with a certain amount of amortization), it may be for a fixed amount (i.e., non-amortizing) or it may be of an increasing amount provided that the client will be able to support the additional amounts of borrowing in the future by increasing the amount of collateral in the account through appreciation of assets currently held or by adding additional assets or income to his HOPE account over time. The level of borrowing may be subject to satisfaction of certain conditions, (i.e., income levels, levels of appreciation or depreciation of capital assets, etc.). The available borrowing alternatives are presented and cross-referenced with PALAO alternatives so that the client can observe how the different levels of borrowings affect his financial planning. Once the client selects the level of borrowing, the selection must be entered into the central computer and verified.

The client is then shown various proposed collateral selections from a submenu featuring those items. In addition to the home or homes that the applicant desires to use as collateral, he may name a number of other assets or asset accounts by cross-referencing to PALAO alternatives. In addition to selecting the assets to be used as collateral, the client must indicate and verify the proposed priority of collateralization of those assets. For example, after the homes are used to collateralize the borrowing, the client may wish the next type of collateral to be used

to be money market account balances or bank account balances since they have a high loan to value ratio and do not offer low interest cost borrowing as is the case associated with loans against single premium whole life insurance policies and annuities. The client selects the assets to be used as collateral and the priority of collateralization, enters the selections into the central computer and verifies the selections.

A client is also presented a menu of potential interest and amortization schedules which includes the priority of funding amortization payments and interests expenses on the proposed mortgage. The client may cross reference to the PALAO alternatives and the level of borrowings selected to see the financial impact the various selections have. By cross referencing to the PALAO alternatives a variety of options are presented, and the client selects one of the options and verifies the interest and amortization schedules and the priority of funding amortization payments and interest expenses.

The client is also presented with a menu of potential term structures of the HOPE mortgage. The effects on the account of the different structures may be seen by cross referencing to the PALAO alternatives. The client enters the term structure selected and verifies his selection.

The client is then presented a menu of potential Priority Investment and Borrowing Orders (PIBO) that are integrally interrelated to the PALAO presented in block. These alternatives may also be cross referenced to PALAO to see the overall effect the different PIBO selections have on the client's account. Once the PIBO is entered and verified, the client selects, enters and verifies the PALAO. It should be noted that once the PIBO has been selected, the PALAO will be approximately determined because the PIBO and PALAO selected must be mutually compatible.

In practice, the client switches back and forth among the various menu screens and cross references the alternative PALAOs suggested in order to select a financial

package that best meets his needs and objectives.

Completion of the preceding steps finalizes the application process and the completed application is submitted to the HOPE Mortgage Loan Department (HMLD) for review. If the application is approved by the loan department, the necessary documents are submitted for review by the HOPE Legal and Regulatory Compliance Department (HLRCD). Upon approval, the Cash Flow and Collateral Monitoring and Forecasting Processes (CFMFP and CMFP) are activated so that any interim changes in either the value of the proposed collateral or the projected cash flow of the client can be determined prior to the time of closing of the mortgage.

Conditional approval of the mortgage is then reported to the client, the client's account manager, the mortgage loan origination department and the mortgage servicing department. A report documenting the approval is also issued to the HOPE account history file. If no adverse change is indicated by the cash flow monitoring and forecasting processes prior to closing, the HOPE mortgage will be closed and reports of its closing will be issued.

If the mortgage application is rejected either by the loan department or the legal and regulatory compliance department, then approval is denied and a report is issued to the involved parties stating the reason for its denial. The client is then given the opportunity to make an alternate mortgage application at a later date if desired.

After the mortgage is closed, the primary responsibility for the ongoing process of monitoring and servicing of the HOPE mortgage belongs to the HOPE Mortgage Servicing Department (HMSD).

Through a personal financial planning model utilizing mathematical programming of which, dynamic programming is a specific type of mathematical programming used in the invention, the Priority Asset and Liability Allocation Process (PALAP) establishes an optimal system of priorities for the allocation of the stocks (quantities)

and flows of financial assets and liabilities. PALAP generates the Priority Asset and Liability Allocation Order (PALAO) and the Priority Investment and Borrowing Order (PIBO) for the client's account. PALAO and PIBO are of great value to the HOPE account client because they show the client the optimal allocation of assets, liabilities, net cash flows and net borrowing requirements over a defined period of time ranked in a prioritized order. PALAO and PIBO are guidelines through which the financial institution can supervise and regulate the actions of a multiplicity of clients who potentially have an infinite number of investment opportunities available to them and by which the financial institution is provided a defined means of satisfying MIM in the event that there is an imbalance in the account. PALAO regulates the stock (quantity) level of asset and liability holdings, while the PIBO regulates the flow of cash into and from assets and liabilities. By executing PALAP, the system generates a preferred allocation of assets and liabilities comprising a PALAO and PIBO based on system default variables and a client directed allocation of assets and liabilities comprising a PALAO and PIBO based on variables specified by the client.

The priority asset and liability allocation process is initiated when a client applies to open a HOPE account or applies for a Hope mortgage. However, the system may also be activated at any other time at the client's, the account manager's or the account supervisor's request. When the process is initiated, the central computer issues a PALAP master menu to the account client. The master menu contains five options for the selection of sub-menus: an investment risk preference/risk aversion menu, a probability distribution menu, a financial report menu, forecasted future economic variables menu, and a constraints menu. The client selects the menus one at a time so that the information contained therein may be added to or modified.

The investment risk preference/risk aversion menu contains information regarding the degree of risk the client is willing to accept with his investments and borrowing. For example, the client may be willing to accept substantial risks by investing in the commodities futures market or by borrowing heavily. The probability distribution

menu contains information regarding the level of certainty and/or uncertainty regarding future events. The financial report menu includes information concerning a client's current balance sheet, income statement and sources and uses of funds. The future economic variables menu contains information concerning predicted future values of economic variables used in financial calculations such as the future HOME borrowing power. The menu of financial and budgetary constraints contains information and account restrictions which may be specified by the client, by the financial institution or by regulatory authorities.

Each of the menus can be completed by either automatic entry means (default mode) or by manual entry means. For example, if a client does not wish to complete the risk preference/aversion menu, he may simply specify certain personal financial data that may be automatically inputted by the system from data generated for existing HOPE clients; and assumptions concerning risk preference/aversion will be automatically entered as the appropriate answers of the menu. Likewise, the probability/distribution menu may be completed automatically through default variables by assuming a normal distribution of the forecast financial variables. The financial report may be completed automatically for clients already having a HOPE account by using the balance sheet, sources and uses of funds and income statements in the client's data file. Information concerning future income and expense items are also contained within the client data file, particularly information related to future salary income and yields on securities held within the HOPE account. The forecast of future financial and economic variables utilized by the financial institution can be entered automatically by incorporating an economic forecast derived from published governmental forecasts or from internal economic reports generated by the financial institution. The menu of constraints may automatically incorporate a default set of constraints stored in the central computer. However, budgetary and other financial constraints are typically subject to individual preference; and usually a client will choose to manually input this information.

After all of the menus have been completed or modified, the input is verified by the

client. If there is an error in input, the process returns to the master menu, through which the client may choose to alter various menu items. After the menus have been verified, a dynamic programming optimization algorithm is executed to generate a series of reports which present the optimum combination of asset and liability holdings given a set of constraints and a defined time horizon to best realize the client's financial objectives. Mathematical programming is a process developed in the field of operational research which performs constrained optimization, i.e. the process endeavors to find an optimal solution to a problem where constraints are defined as limits. Although any of the several varieties of mathematical programming may be used in connection with the invention, the nature of financial markets and the behavior of individuals seeking to maximize their returns in financial markets is dynamic, that is, the solution generated to personal financial planning problems should take into consideration the change in variables over time as well as the rate of change of variables over time. Accordingly, dynamic programming is recommended as the type of mathematical programming to be used in the preferred embodiment of the invention. The entries specified through the constraint menu present a set of constraints that must be considered in generating the optimum financial solution for the client. Thus, the PALAO and PIBO generated through this process are the optimum financial solution to maximize the client's financial objectives specified through the menus.

The reported output is then cross referenced to the client account files and verified. Reports are then issued to the account manager, client account data file and the client. The reports include a HOPE account client balance sheet over a defined period of time, a sources and uses of funds statement for the designated time period, an income, profit and loss statement for the time period considered, and a recommended PALAO and PIBO.

After the reports have been issued, the HOPE account client will be requested to accept or modify the suggested PALAO and PIBO. An automatic update of these reports may be requested either in full presentation form or alternatively, in a filtered

form which highlights only the modified variables. The filtered variables may be manually selected or automatically selected according to a system default set of variables. For example, a client may only be interested in receiving an updated report if a change in an economic variable is going to affect his retirement income or a client may be indifferent to changes in economic variables that insignificantly effect his portfolio holdings.

After the reports are issued, the client and the account manager have the option to run PALAP again by repeating the process starting at the step represented by block.

For example, the client may prefer to select a real-time updated version of PALAO and PIBO based upon a PALAP updated with respect to changes in key financial variables such as changes in interest rates on borrowing costs, dividend yields on common stock prices, and returns offered on various types of annuities.

If the HOPE account client selects the recommended PALAO and PIBO, a record of this is entered into his client file, the account history file, and the mortgage servicing department master file. If the client chooses not to follow the system's recommendations, the client is given the opportunity to designate a PIBO and PALAO. Once the HOPE account client completes the master menu, his selections are entered in the system files.

If the client rejects the automatically generated PALAO and PIBO and he does not designate a PALAO and PIBO, the client is offered the opportunity to generate alternate PALAOs and PIBOs. If the client desires an alternate PIBO and PALAO, the process returns to the PALAP main menu where the client is given the option to change his responses to the PALAP menu previously completed. If the client does not want to change what was previously specified or he does not desire to specify an alternate PALAO and PIBO, then he is notified that the PALAO and PIBO first recommended to him will be applied automatically to his account and will be used for allocating his future net cash flows and borrowing requirements. After the report

is issued, the client is offered another opportunity to designate an alternate PALAO and PIBO and rerun PALAP. If the client does not desire to run PALAP again, the system recommended PALAO and PIBO and the default PALAP is entered and reported to the appropriate data files.

Figure **16A** illustrates an exemplary welcome screen according to one embodiment of the present invention. As depicted, the welcome screen includes links **1000,1002** to various other pages on a website which includes the financial management system. One of the links, such as an On-line Services link **1004**, should take a user to a page where the user can access the financial management system, such as the page shown in Figure **16B** and described below.

Figure **16B** is an exemplary screen print of a graphical user interface of the financial management system which a client uses as a personalized website to collaborate with a dedicated virtual (or live) financial advisor. As depicted, the graphical user interface can include an advisor area **1010**, where the advisor may be represented as a still image, via streaming video, or represented by a character. Selecting a link, such as the Contact Advisor link **1012** shown, causes a connection to the advisor to be established. Preferably, the advisor and the user are able to communicate orally via network telephony of a type known in the art, but communication via email, chat, telephone call, or of any other type is acceptable.

The advisor uses the space to negotiate an initial Service Level Agreement (SLA), and begin the modeling of the customer's Lifepath. This flushes out issues and permits an early estimate of customer value potential. The SLA nails down how much advisor time the customer wants, how information will be shared, and how much intentions-based advice the customer will welcome. The advisor configures the Web site in accordance with this agreement. The investment of effort in this, along with the personal online relationship begins to develop 'stickiness. Much of the communication presented by the system is generated by rule-based business logic. This is what leverages the advisors, extending their reach. It should be noted

that the client negotiates a Service Level Agreement at the start of the relationship for desired level of advisor support and how the bank may or may not use their personal information. Website functionality can provide new levels of customer support even if customer wants low level of advisor interaction.

A link **1014** may be provided that allows access to email. Other links can include a link **1016** to personal memoranda, a link **1018** to a links page, and a link **1020** to a financial calendar. As an option, a calendar **1022** and links **1024** to news stories may be displayed on the page.

A virtual coach area **1026** of the page can be provided to display the comments and advice created by the virtual coach. As described above, client data drives a rules-based "advice engine" that dynamically analyzes customer needs and automates most of advisor's work. The client is encouraged to consolidate all their financial information in the site, recognizing assets and liabilities with other financial institutions.

Upon selection of a button depicted along the bottom of the screen, a particular feature of the financial management system is displayed. For example, selecting the learn button **1028** may bring up a portion of the screen (or a new screen) that discusses the functions and features of the financial management system. The plan button **1030** may display a screen as shown and described in Figure **16C**. A decide button **1032** may display a screen that allows the user to make financial decisions, such as allowing a user to select transactions recommended by the advisor and/or the virtual coach. A transact button **1034** may display a transaction screen on which the user performs transactions. A monitor button **1036** may display current and/or historical information about transactions made by the user and/or financial performance.

Figure **16C** is a sample screen print of the interactive life path model **462**. The life path interactive financial model captures customer's intentions at the start of the

relationship and displays them as lifetime cash flow requirements. Customer data and life path information combine to form a deep understanding of the customer's financial needs at each stage of life. Using dynamic, interactive multimedia, it quickly captures the customer's intentions and expectations about an ideal future. This flushes out some issues which trigger the initial discussions in the relationship. It also supports estimating the lifetime value of the customer and the appropriate levels of service. The data from this model combines with insight from product and transaction history as well as real time input from the abundance of interactive models to power rule-based advice engines. This automated advice leverages the advisor's time so that a broad customer based can be profitably supported. Configured using sliders and other interactive controls, there is little typing to slow the process down. The controls build a linear graphic representation of a life path which models predictable life transitions over time more effectively then data-driven calculators. Sales opportunities, lifetime customer value and appropriate fee structure are now more accurately identified.

Risk analysis may be integrated into the life path model enabling clients to better understand their financial health and to improve trade-off decisions. Formulating a personal risk/reward strategy is difficult. The life path model supports a risk simulator, showing how the ideal model would be impacted by typical life crises. The model can be played repeatedly with varying outcomes to foster an intuitive understanding of exposure and to provide grounded input into trade-off decisions. Using the risk modeling tools, the advisor can add value, consolidate the relationship and rationalize a stream of product sales.

As shown in Figure **16C**, life path model **462** captures the user's life intentions expressed as revenue intentions **1050** and expense intentions **1052**. As discussed above, revenue intentions **1050** are a summary of the user's income information **1054**. The user is provided with an individual button for each of the income information categories **1054**. For example, the user can input their income information such as salary, investment, pension, alimony, or disability, or other financial information as shown in Figure **16C**. Similarly, the user can input their

expense intentions which are shown by the category of interactive buttons **1056**. For example, the user can input expense information such as housing, transportation, education, health care, or other expense information as shown in Figure **16C**.

Additionally, the user can control the level of risk that the model considers by selecting one or more of the graphical user interface ("GUI") elements from the list of risk events **1058**. The risk events **1058** include various life events that may affect the user's life path model. For example, the user can request that the model include job loss, disability, casualty, market downturn, or other personal risk factors into their life path model.

After providing the model with his or her life intentions expressed as revenue intentions **1050** or expense intentions **1052** in addition to any of the risk events, the user can select button **1062** to run the life path model and initiate the advice generating subsystem. Accordingly, the user is provided with detailed advice in window **1060** that is tailored to the user's life intentions and the risk events specified. As shown in window **1060**, the user is provided with a clear automated advice tailored to his or her life intentions gathered by the life path model. Furthermore, the advice incorporates the risk events specified from the risk factors **1058**. Additionally, the system provides the user with virtual coaching that watches the actions of the user while progressing through the life path model and provides the user with suggestions to ensure that they continue to comply with his or her life intentions.

Figure **17** is a simplified block diagram illustrating a financial analysis system **1100** in which one embodiment of the present invention may be used. Generally, the financial advisory system **1100** includes a simulation module **1108** which receives input data from a user interface (UI) **1112** and provides data, such as probability distributions, to the UI **1112**. The simulation module may include a simulation engine for empirically generating draws from a random distribution. According to the embodiment depicted, the simulation module **1108** further includes a pricing

module **1102**, a factor module **1104**, a style analysis module **1106**, and a portfolio optimization module **1110**.

The pricing module **1102** may generate pricing data for one or more assets. In one embodiment, pricing module **1102** generates pricing data for three assets (e.g., short-term bonds, long-term bonds and U.S. equities). These assets are used as core assets by simulation module **1108** for simulation functions. Alternatively, the core assets may be different types of assets, such as U.S. equities and bonds (making no distinction between short-term and long-term bonds). Of course, a different number of core assets may also be used.

In one embodiment, pricing module **1102** generates a number of asset scenarios. Each scenario is an equally likely outcome based on the inputs to financial advisory system **1100**. By generating a number of scenarios with pricing module **1102**, financial advisory system **1100** may generate statistics for different projected asset valuations. For example, financial advisory system **1100** may provide probability distributions for each projected asset valuation.

Factor module **1104** receives core asset pricing data from pricing module **1102** and maps the data onto a set of factors. Factors output by factor module **1104** are used by returns-based style analysis module **1106** to generate style exposures for particular assets. Factor modules and style analysis are well known in the art and are not described in greater detail herein. Factor module **1104** and style analysis module **1106** may perform the functions as described in "Asset allocation: Management style and performance measurement," by William F. Sharpe, Journal of Portfolio Management, Vol. 18, No. 2, which is hereby incorporated by reference.

The portfolio optimization module **1110** may determine one or more optimal portfolios based on input provided to financial advisory system **1100** via UI **1112**. Portfolio optimization may be performed in any manner known in the art and is not central to the present invention. Importantly, the simulation module **1108** may reside

on a server or on the same computer upon which the UI **1112** resides. As will be described in further detail below, the UI **1112** may include various mechanisms for data input and output to provide the user with a means of interacting with and receiving feedback from the financial advisory system **1100**, respectively.

The UI **1112** attempts to help the user pick the right financial products to meet his/her needs in a world where the number of financial products and decisions related thereto may be overwhelming. According to one embodiment, the UI **1112** helps the user pick the right products by focusing the user on the relevant decisions and showing the user various notions of risk via simulated outcomes that are based upon a set of recommended financial products that satisfy the user's current decision values.

Figure **18** illustrates an advice summary screen **1200** according to one embodiment of the present invention. According to the embodiment depicted, the advice summary screen **1200** includes three separate areas: (1) an area **1202** for decisions, (2) an area **1204** for depicting output values (also referred to as results), and (3) an area **1206** for depicting recommended financial products.

Area **1202** organizes all the decisions in one place. While prior art systems, such as retirement calculators, often make the user provide assumptions, data and decisions all in one place, according to the embodiment depicted, the decisions are kept separate. For example, in one embodiment, graphical input mechanisms, such as slider bars are grouped together in a predefined portion of the display that is separate from the output values and the recommended financial products. In this manner, the user will not confuse the things the user can control and change (e.g., savings rate or level of savings) and those things the user cannot change (e.g., inflation, rate of return for a particular financial product). Further, area **1202** may present a constrained set of decisions. That is, only the relevant decisions upon which the user needs to focus may be presented. Another feature of the present embodiment is the fact that the decisions are always feasible and in some cases are additionally

constrained to be optimal. Calibration of input mechanisms is discussed below.

Importantly, decision variables may vary from implementation to implementation. For example, in a retirement planning system, decision variables might include one or more of: risk, level of savings, and retirement age. In contrast, a mortgage analysis package may include decision variables such as cost of house, length of mortgage, and amount of down payment. Exemplary input mechanisms for allowing the user to specify decision variable values are described further below.

Based upon the decisions, the portfolio optimization module **1110** produces a recommended set of financial products and the simulation engine projects the outcomes of holding the specific financial products recommended. Area **1204** organizes all the output values relating to the recommended set of decisions and financial products in one place. For example, in one embodiment, graphical representations of the output values are grouped together in a predefined portion of the display that is separate from the decisions and the recommended financial products. The output values are made available to users to allow them to arrive at a set of financial products that satisfy their objective functions. For example, some individuals have a need to have a certain amount of money in the future and others may have a need to avoid short-term losses. Generally what is meant by objective function is a criterion that an individual considers important in making a decision. In various embodiments of the present invention, the output values may include: the cumulative probability of reaching a predetermined goal, the most likely value of a given portfolio at some future point in time, the financial loss that might occur with a 5% probability within the next 12 months, and various other statistics based on the probability distribution employed by the simulation engine.

Different output values may be appropriate for different people. Therefore, by presenting a number of different output values in area **1204**, users are given the ability to focus on whatever output values that may appeal to them. In one embodiment, this section of the advice screen **1200** may be adaptive. That is, a user

may select to have displayed one or more output values that are relevant to satisfying his/her objective function. Importantly, output values may be displayed in various orders and not all output values need to be displayed concurrently.

It is appreciated that different output values may also be appropriate for different problems. For example, in a retirement planning system, it may be desirable to have output values that depict short- and long-term financial risk and the cumulative probability of reaching a financial goal. While a mortgage analysis package may include output values such as cash flow, the highest a mortgage payment might be within 5 years, the probability of hitting the cap of an adjustable rate mortgage, the probability of paying higher interest costs for a particular fixed cost mortgage than a particular adjustable rate mortgage, etc.

Area **1206** presents the user with the actions to be taken to get the results depicted in area **1204**. For example, an indication of recommended financial products may be provided based upon the user's decisions. Additionally, recommended proportions of a user's wealth that should be allocated to each financial product may be textually and/or graphically communicated. Another function of area **1206** is organizing all the actions resulting from the decisions in one place. For example, in one embodiment, graphical representations of the recommended financial products are grouped together in a predefined portion of the display that is separate from the decisions and the output values.

Areas **1202, 1204**, and **1206** may be tied together by the simulation engine and the portfolio optimization module **1110**. For example, the portfolio optimization module **1110** may produce an optimal set of financial products for a given set of decisions. Further, the simulation engine may connect the decisions to the results by projecting the outcomes of owning the set of financial products recommended by the portfolio optimization module **1110**.

In the embodiment depicted, areas **1202, 1204**, and **1206** are concurrently displayed.

In alternative embodiments, however, two of the areas may be displayed concurrently and the third area may be displayed on another screen or at a later time. For example, a visual indication depicting input mechanisms for receiving input decisions and a visual indication depicting a set of output values based upon the input decisions may be displayed simultaneously thereby allowing the user to observe updates to the output values in response to changes to one or more of the input decisions. Then, when the user is satisfied with the output values, he/she may view the recommended financial products upon which the output values are based.

The UI **1112** may provide graphical input mechanisms for allowing a user to provide values for one or more decision variable inputs. As discussed earlier, one disadvantage of some prior financial analysis programs is that the user is often presented with future scenarios that are not feasible and is therefore free to choose collections of financial products which are not optimal. That is, the user interfaces do not constrain the user's input to specific available financial products and they do not eliminate combinations of financial products which are dominated. By a dominated decision what is meant is a decision in which the user can absolutely make him/herself better off in one respect without making him/herself worse off in any other respect. In embodiments of the present invention, various dominated decisions may be eliminated. For example, the system may assume that the recommended portfolio should lie on the efficient frontier.

As a feature of the present embodiment, various positions (settings) of a graphical input mechanism relating to investment risk may be constrained based upon a set of available financial products available to the user.

Referring to Figure **18**, an exemplary set of financial products **1208** that may be available to a user are shown in area **1206**. The financial products **1208** may be the investments that are available through an employer's 401(k) program, for example. According to one embodiment, the financial products **1208** may be listed in order of the volatility of their returns.

Referring again to Figure **18**, exemplary graphical input mechanisms are depicted in area **1202**. According to one embodiment of the present invention, slider bars are the mechanism by which values regarding decision variables are communicated between the simulator and the user. For example, the user may modify the current value of a particular decision variable by selecting the appropriate slider with an input device and moving the slider to a new position. According to the embodiment depicted, the decision variables upon which the simulator's probability distribution is dependent include the user's risk tolerance, the user's savings rate, and the user's desired retirement age. Therefore, in this example, the UI **1112** includes at least three slider bars including a risk slider bar **1210**, a savings rate slider bar **1216**, and a retirement age slider bar **1218**.

The risk slider bar includes a left end point **1212**, a right end point **1215**, and a slider **1214**. The left end point **1212** represents the lowest risk feasible portfolio and the right end point **1215** represents the highest risk feasible portfolio. The user may indicate his/her risk preference to the financial analysis system by positioning the slider **1214** anywhere between the left end point **1212** and the right end point **1215**, inclusive. To assure every position of the risk slider **1214** is within the feasible set of risk available to the user, the risk slider bar **1210** is calibrated based upon the set of financial products that are available to the user. Preferably, the simulation module **1108** additionally keeps the user on the efficient frontier by recommending only portfolios of financial products that will result in the highest return for a particular level of risk. This means as the user positions the risk slider **1214**, the simulation module **1108** may construct a portfolio from the available set of financial products which has the highest returns for the specified level of risk. For example, assuming the risk slider bar **1210** were calibrated to the set of mutual funds shown in Figure **18**, then positioning the risk slider **1214** at the left end point **1212** would correspond to the highest return portfolio having a risk equivalent to or less than that of the Vanguard Money Market Fund. Similarly, positioning the slider **1214** at the right end point **1215** would correspond to the highest return portfolio having a risk

equivalent to or less than that of the Vanguard Small Cap Fund. Advantageously, in this manner the UI **1112** by way of the risk slider bar **1210** prevents the user from selecting a level of risk outside of the feasible set of risk that is actually available to the user.

It should be appreciated the savings rate slider bar **1216** and the retirement age slider bar **1218** may be similarly constrained to feasible values. For example, the savings rate slider bar **1216** may be constrained to values between zero and the maximum contribution for a particular account type, such as a 401(k). Also, the retirement age slider bar **1218** may be constrained to allow values between the user's current age and an upper bound that may be determined with reference to actuarial data, for example.

As an option, a risk slider bar that may be provided to allow a user to specify a desired level of investment risk, for example. The risk slider bar includes a slider, and an indication of the current volatility. According to one embodiment, the volatility of the risk slider bar is expressed as a proportion of a predefined volatility, such as the volatility of the Market Portfolio or the volatility of the average individual investor's portfolio, for example. The Market Portfolio is the portfolio consisting of a value-weighted investment in all available assets.

The left most setting may correspond to the volatility associated with the lowest volatility mix of financial products in the set of available financial products. For example, a current volatility of the risk slider may be 0.3 times., indicating that the volatility associated with the current setting of the risk slider bar is 30% of the volatility of the predefined volatility. As discussed below, the volatility of the financial products recommended by the portfolio optimization module **1110** corresponds to the current setting of the risk slider. The midpoint setting corresponds to the predefined volatility. The right most setting of the risk slider bar reflects the volatility associated with the highest volatility mix of financial products in the set of available financial products.

Each setting of slider bar corresponds to a unique volatility, and a recommended set of financial products whose volatility is equal to that volatility. Advantageously, in the manner described above, the user may choose the desired volatility of his/her portfolio of financial products relative to the predefined volatility. A portfolio having a volatility equal to the predefined volatility may be chosen by positioning the slider at the midpoint. If the user would like the recommended portfolio to be less volatile than the predefined volatility, then the user may position the slider to the left of the midpoint. Similarly, if the user would like the recommended portfolio to be more volatile than the predefined volatility, then the user may move the slider to a position right of the midpoint. Further, it should be appreciated, the volatility associated with the midpoint will remain the same regardless of the composition of the available set of financial products.

While only three different positions of the slider have been described, it should be appreciated any number of positions may be located along the risk slider bar and each position may be associated with a volatility measure defined by a constant times the portfolio volatility divided by the predefined volatility.

Figure **19** is a flow diagram illustrating a method of depicting recommended financial product portfolios according to one embodiment of the present invention. At step **1300**, a combination of financial products that maximizes the user's utility is determined. This recommended set of financial products is the set that provides the highest investment return given one or more decision variables specified by the user which may include one or more of risk preference, level of savings, and a time horizon. According to one embodiment, the recommended set of financial products is located on an efficient frontier comprising the set of available financial products. An efficient frontier is the space of recommended portfolios of financial products that is indexed by one or more of the decision variables and that is constrained to maximize the user's utility. Preferably, the efficient frontier determination takes into account one or more of the level of savings and a time horizon.

At step **1302**, an updated decision variable value is received. According to one embodiment, the user may modify risk, savings, and/or retirement age decision variables by adjusting the position of a corresponding slider. Various other input mechanisms, graphical and/or textual, may be used, however, to receive decision variable values. For example, in alternative embodiments, text entry fields may be provided for entry of decision variables.

At step **1304**, the simulation module **1108** determines the optimal allocation of wealth among the financial products available to the user based upon the current values for the decision variables.

At step **1306**, the optimal allocation determined in step **1304** is presented to the user in a graphical form. As above, the graphical feedback presented to the user may be provided in real-time as the user manipulates a graphical input mechanism (e.g., slider bar). For example, while an input device, such as cursor control device, is engaged steps **1302** through **1306** may be repeated for each new position of the selected slider bar. In this manner, the graphical depiction of the optimal allocation of wealth among the financial products will reflect the recommendation at the current position of the slider bar and the user receives feedback in the form of a dynamic graph as the slider bar is moved to various positions without deactivating the input device.

According to one embodiment, the graphical form in which the optimal financial product allocation is depicted comprises a bar chart. The screen includes a bar chart and one or more slider bars such as risk slider bar for receiving input decision values. The bar chart includes a list of available financial products. Each of the financial products are displayed adjacent to a corresponding graphical segment, in this example a bar, having a size (length) representing the percentage of wealth allocated to that particular financial product according to the current recommendation. For example, the current recommended allocation of wealth

suggests 31% be allocated to one financial product, 50% to a second financial product, 7% to a third financial product, and 5% to a fourth financial product. In the present example, the available financial products may be organized from left to right in order of increasing volatility of the financial product returns. Of course, alternative ordering and allocation units, such as dollar amounts, may be called for depending upon the implementation. The risk slider bar includes an indication of the current volatility and a slider.

Assuming the user increases the risk, the bar chart would indicate the recommended financial product allocation corresponding to the updated risk tolerance value.

It may be the case that the user wants to modify the set of recommended financial products. For instance, desiring to hold more or less of a financial product than was recommended. In this event, the user may modify the recommendation thereby causing the system to update the recommended financial products taking into account the user's modification. Another mechanism, referred to as a user constraint, is provided by the UI **1112** to allow the user to express his/her utility function by modifying the recommended allocation provided by the system. Generally, a user constraint acts as another decision input. More particularly, a user constraint provides the user with the ability to constrain the holdings of one or more financial products by manipulating the recommended financial products. In one embodiment, responsive to receiving the constraint, the portfolio optimization module **1110** optimizes the remaining unconstrained financial products such that the portfolio as a whole accommodates the user's constraint(s) and is optimal for the user's level of risk tolerance. For example, the user may express his/her desire to hold a certain percentage of a particular financial product in his/her portfolio or the user may express his/her preference that a particular financial product not be held in his/her portfolio. Upon receiving the constraint, the portfolio optimization module **1110** determines the allocation among the unconstrained financial products such that the recommended portfolio as a whole has the highest utility. Advantageously, in this manner, individuals with utility functions that are different than mean-variant

efficient are provided with a mechanism to directly manipulate the recommended financial products to communicate their utility functions.

Figure **20** is a flow diagram illustrating a method of updating a recommended portfolio based on a user specified constraint according to one embodiment of the present invention. At step **1400**, selection of a financial product's graphical segment is detected. At step **1402**, the selected segment may be resized according to cursor control movement. At step **1404**, when the resizing is complete, the value associated with the graphical segment is locked. At step **1406**, a new set of financial products are recommended. For example, the unconstrained financial products may be re-optimized conditional upon user constraints by determining an optimal allocation of wealth among the remaining financial products. At step **1408**, the recommended optimal allocation for the unconstrained financial products is graphically depicted. It is appreciated that numerous other ways of selecting and manipulating a graphical segment are possible. For example, certain keystrokes on a keyboard such as alphanumeric input device may be employed to activate various graphical segments and other keys may be used to increase or decrease the current allocation.

Again, as above, the graphical feedback presented to the user may be provided in real-time as the user manipulates the size of the graphic segment.

By employing the UI components described above, a user may manipulate decision variables and/or the recommended portfolio and simultaneously see the impact on the set of outcomes. This process of self explication of preferences will now briefly be described.

According to one embodiment of the present invention, during an initial session with the financial advisory system, the user may provide information regarding risk preferences, savings preferences, current age, gender, income, expected income growth, current account balances, current financial product holdings, current savings rate, retirement age goal, retirement income goals, available financial products,

intermediate and long-term goals, constraints on fund holdings, liabilities, expected contributions, state and federal tax bracket (marginal and average). The user may provide information for themselves and each profiled person in their household. This information may be saved in one or more files in the financial advisory system 100, preferably on one of the servers to allow ongoing plan monitoring to be performed. In other embodiments of the present invention additional information may be provided by the user, for example, estimates of future social security benefits or anticipated inheritances.

In any event, based on the user's current holdings and the other data input by the user, the financial advisory system may provide various output values. The simulation module **1108** may provide a probability distribution of future portfolio values based on a set of recommended financial products and current decisions including, for example, risk preference, savings rate, and desired retirement age. Additionally, in view of the user's financial goals, the current decision variables, and the probability distribution, the simulation module **1108** may provide an initial diagnosis which may result in a series of suggested actions to the user regarding a recommended portfolio that maximizes utility conditional upon the current decision variables.

Once the user has provided the financial advisory system with any necessary information, an interactive process of modifying the value of a decision variable, observing the change in one or more output values associated with the current decision variable values, and seeing the recommended financial products that created that particular change may begin. This process of the system providing feedback and the user adjusting decisions may continue until the user has achieved a desired set of decision values and financial products that produce a desired set of results. Advantageously, using this interactive approach, the user is never asked to predict the future with regard to interest rates, inflation, expected portfolio returns, or other difficult to estimate economic variables and parameters.

Figure **21** illustrates an investment portfolio management method utilizing a coaching engine in a network based financial framework. First, in operation **1500**, a plurality of parameters are set for a subject utilizing a network. The parameters include personal investment parameters **1502**, personal financial parameters **1504**, and/or asset mix parameters **1506**. Such parameters may include a minimum retirement, target floor, investment rate, tax implications, etc. In operation, the parameters may be selected manually by the subject using a desired graphic user interface, or by a third party.

Next, the network is utilized to provide the subject coaching from an investment coaching engine in operations **1508**, where such coaching relates to the setting of the parameters. The coaching may be provided by utilizing a look-up table which is capable of generating various combinations of advice based on the settings. In the alternative, the advice may be generated using any other type of artificial intelligence system.

At least one financial model for a portfolio of the subject is subsequently generated in operation **1510** based on the setting of the parameters. This may be generated using a system similar to that which generates the coaching, or any other desired means. The network is again used to provide coaching from the investment coach engine to the subject with the coaching relating to the generated financial model.

As shown in Figure **21**, the personal investment parameters include a risk tolerance parameter **1512**. Further, the coaching by the coaching engine **1514** may provide a textual risk tolerance profile for the subject based upon an interpretation of current risk tolerance parameters of the subject as textual analysis.

Further, the personal investment parameters may include an investment style parameter **1516**. In such embodiment, the coaching by the coaching engine **1518** provides a textual investment style profile for the subject based upon an interpretation of current investing style parameters of the subject as textual analysis.

In still yet another embodiment of the present invention, the personal investment parameters include a bull/bear attitude parameter **1520**. In the present embodiment, coaching by the related coaching engine **1522** provides a textual description of an implied future of financial markets and graphs showing forecast curves of financial markets based upon the building of financial market forecasts which are, in turn, based upon evaluations from financial experts.

In one embodiment, the coaching by the coaching engine **1524** relating to the setting of the personal financial parameters in operation **1525** provides an alert if the investment parameters of the subject conflict with life path cash flows or personal parameters based on a consistency check of the investment parameters with data obtained from a life path model and personal investment parameters.

Various details relating to the inputs, outputs, and algorithms for the various foregoing coaching engines are summarized in the following table:

Coach	Inputs	Algorithm	Outputs
Set Risk Tolerance	Current risk tolerance parameters	Interpret parameters as textual analysis	Textual risk tolerance profile
Set Investment Style		Same as above	Textual investment style profile
Set Bull/Bear Attitude	Evaluations of expert advice	Build forecasts of Dow, S&P, Interest Rates, etc., based on weighted & consolidated views of future	• Textual description of implied future • Graph showing forecast curves
Input Investment Parameters	• Data from lifepath model • Input Parameters: 1. Target Portfolio 2. Current Portfolio 3. Investment Horizon 4. Minimum Acceptable End Balance 5. Contribution Rate 6. Personal Parameters	Check consistency of investment parameters with data from lifepath model & personal investment parameters	"Alert" if investment parameters conflict with lifepath cashflows and/or personal parameters, otherwise confirmation

With continuing reference to Figure **21**, the coaching by the coaching engine **1526** relating to the setting of the asset mix parameters in operation **1528** provides a rationalization of the asset mix based on personal and financial parameters of the subject and at least one computer generated asset mix. No penny stocks would be included if the subject is conservative, only treasury bills. A pie chart may also be included that represents a portfolio showing the subject's assets.

Various details relating to the inputs, outputs, and algorithms for the coaching engine **1526** are summarized in the following table:

Coach	Inputs	Algorithm	Outputs
Set Asset Mix	• Personal & financial parameters • Computer-generated asset mix	• Coach rationalizes asset mix based on parameters	Rationalization of asset mix

In still another embodiment, the financial model comprises a model of an existing investment portfolio of the subject. Note operation **1530**. The coaching by the coaching engine **1532** provides an analysis of market-related growth by security and sector, trend analysis, fee and service analysis, and/or dividend and interest impact based upon transaction history and current market values of the existing investment portfolio.

The coaching by the coaching engine **1532** may also provide an analysis of growth, risk and value of the existing investment portfolio based on market data and expert analyst opinion.

Still yet, the coaching by the coaching engine **1532** may provide an evaluation of the existing investment portfolio relative to the personal and financial parameters of the subject based on a comparison of growth and volatility projected forecasts to the personal and financial parameters of the subject. It should be noted that similar capabilities may be provided using a model based on a computer generated portfolio in operation **1534**.

Various details relating to the inputs, outputs, and algorithms for the coaching engine **1532** are summarized in the following table:

Coach	Inputs	Algorithm	Outputs
Model Existing Portfolio: Analyze Performance To Date	• Transaction history • Current market values	• Isolate market impact from sales/purchase impact • Breakout by security type • Calculate portfolio trends • Calculate impact of fees, etc	• Analysis of market-related growth by security type, by sector • Trend analysis • Fee, service analysis • Dividend & interest impact
Get Research	• Market data feeds • Expert analyst opinion	• Convert raw data to syntactic textual analysis • Integrate expert opinion (text)	Provide growth, risk & value analysis of current portfolio, for each security
Generate Display	Growth & volatility projection	Compare forecast to personal & financial parameters	Evaluation of portfolio relative to personal & financial parameters

In operation **1536**, the financial model may include a model of an investment portfolio of the subject generated by the subject with the input of a private banker. Coaching by the coaching engine **1538** provides an analysis of growth, risk and value of each security in the investment portfolio based on a concatenated, user-friendly English format of market data and expert analyst opinion obtained utilizing the network.

Further, the coaching by the coaching engine **1538** may provide an evaluation of the contributions of securities in the investment portfolio relative to the personal and financial parameters of the subject based on a comparison of the personal and financial parameters of the subject to an analysis of risk compliance, growth, and volatility.

Various details relating to the inputs, outputs, and algorithms for the coaching engine **1538** are summarized in the following table:

Coach	Inputs	Algorithm	Outputs
System Translates Data	• Market data feeds • Expert analyst opinion	• Convert raw data to syntactically correct English • Analysis concatenate expert opinion	Provide growth, risk & value analysis for each security
System Does Impact Analysis	Risk compliance, growth & volatility analysis	Compare growth & volatility of portfolio to personal & financial parameters	Coaching evaluates contribution of security relative to personal & financial parameters

Figure **22** is a flowchart illustrating a method for automated portfolio generation utilizing a network. First, in operation **1600**, financial information is received from a subject utilizing a network. In one embodiment of the present invention, the financial information of the subject includes personal investment parameters and/or financial parameters of the subject.

Filters are then generated based on the received information of the subject in operation **1602**. Thereafter, historical data is obtained on investments utilizing the network. Note operation **1604**. The historical data on investments is then filtered in operation **1606** with the generated filters. Using the filtered data, a financial portfolio may then be generated for the subject in operation **1608**. Further, the filtered data may be weighted by an asset mix and/or risk tolerance of the subject.

In operation **1610** shown in Figure **22**, aggregated growth and volatility may be calculated based on the built financial portfolio. Further, it may be determined whether the aggregated growth and volatility match the financial information of the subject. Note operation **1612**. When it is determined in decision **1614** that the aggregated growth and volatility fail to match the financial information of the subject, the filters may be adjusted. Such filters are adjusted until the aggregated growth and volatility match the financial information of the subject. Finally, in operation **1616**, displays are generated based on the built financial portfolio.

Figure **23** illustrates a flowchart for modeling an existing financial portfolio. First, the performance of at least one investment of a subject is determined utilizing a network. As shown, the performance of the investment includes obtaining a transaction history of the investment in operation **1700**, obtaining a current market value for the investment in operation **1702**, and analyzing the performance of the investment based on the transaction history and the current market value of the investment. Note operation **1704**.

Next, financial information is obtained relating to the investment of the subject. The step of obtaining the financial information relating to the investment may include obtaining historical data on the investment in operation **1706**, and obtaining research relating to the historical data of the investment in operation **1708**.

With continuing reference to Figure **23**, the aggregated growth and volatility of the investment is calculated in operation **1710**. Such calculation may be performed based on bell curves, and other statistical techniques. Best case and worst case scenarios may also be produced.

A projection to a target date is subsequently built for the investment. Note operation **1712**. This is done based on the determined performance of the investment, the financial information relating to the investment, and/or the calculated aggregated grown and volatility of the investment. Finally, displays are generated based on the built projection. Note operation **1714**.

As shown in Figure **23**, coaching and a report **1716** may be provided to the subject utilizing the network based on the determined performance of the investment. Further, coaching may be provided to the subject utilizing the network based on the obtained financial information relating to the investment. Note operation **1718**. Such network may also be used to provide coaching in operation **1720** with the generated displays relative to personal and financial parameters of the subject.

Figure **24** illustrates a flowchart for a method that generates a portfolio in a network-based financial framework. First, a draft investment portfolio is generated for investments of a subject in operation **1800**. This may simply be a boilerplate file, or generated using a knowledge base. The subject is then queried utilizing a network to select a security level for transmitting and receiving information utilizing the network. Note operation **1802**.

Thereafter, financial information is obtained relating to the investments of the subject in operation **1804**. In one embodiment, the financial information includes historical data of at least one investment of the subject, technical and fundamental information relating to the investment of the subject, research relating to the investment of the subject, recent news relating to the investment of the subject, and/or expert opinions relating the one investment of the subject.

Next, the obtained financial information is translated into a coaching format in operation **1806**. The subject is then provided with coaching utilizing the network based on the translated financial information. See operation **1808**.

In operation **1810**, the subject is permitted to request a trial exchange of an existing investment portfolio of the subject with the draft investment portfolio utilizing the network. An impact analysis is then performed in operation **1812** for risk compliance, or growth and volatility in response to the exchange of the existing investment portfolio with the draft investment portfolio. As an option, the subject may be provided with coaching based on the performed impact analysis. Note operation **1814**.

In operations **1816** and **1818**, the subject may be queried utilizing the network to accept or reject the exchange of the existing investment portfolio of the subject with the draft investment portfolio. The various steps of the present invention may then be repeated upon receipt of a rejection and/or an acceptance of the exchange.

Figure **25** is a flowchart setting forth a method for setting risk tolerance in a network-based financial framework. First, in operation **1900**, a security type is identified for at least one investment of a subject utilizing a network.

Next, at least one negative scenario for a possible future prospect of the identified security type is presented to the subject. In a preferred embodiment, the presentation of the negative scenario is provided by displaying a first negative scenario for a first possible future prospect of the identified security type in operation **1902**, displaying a second negative scenario for a second possible future prospect of the identified security type worse than the first possible future prospect in operation **1904**, and displaying a third negative scenario for a third possible future prospect of the identified security type worse than the second possible future prospect in operation **1906**.

The subject is subsequently queried utilizing the network for a response to the negative scenario. In particular, the subject is queried as to whether he or she wishes to "bail out" of the scenario.

Next, a risk profile of the subject is generated in operation **1908** based on the response from the subject utilizing the network. It should be noted that different risk preferences may be provided for different accounts. Further, the risk profile may be based on trade, and not necessarily time. As an option, the various steps of the present invention may be repeated in operation **1910** for each type of security held by the subject, or for the investments of the subject in a retirement, tax-deferred environment. As a further option, coaching may be afforded to describe the risk profile of the subject in operation **1912**. Further, the process may be repeated in a retirement, tax deferred environment in operation **1914**.

Figure **26** illustrates a flow diagram for determining an investment style in a network-based financial framework. The present technique is intended to not just ask questions, but provide scenarios. It sets up a portfolio of stocks that an investor

can trade or not trade on these fictitious stocks, and provides examples of how the stock market can move. The present method develops a profile and helps target information effectively for the particular person. Coaching is strategically designed to keep the risk minimal by avoiding telling what someone should do. Scenarios will also identify areas of weakness in one's knowledge.

First, in operations **2000,** at least one interactive input exercise is conducted with a subject utilizing a network. Such interactive input exercise relates to finance.

In one embodiment, the interactive input exercise may include top down or bottom up test scenarios **2002**, trading frequency test scenarios **2004**, needs for information and research test scenarios **2006**, level of expertise test scenarios **2008**, and/or strategic or pragmatic test scenarios **2010**. For example, a bottom up investor would start with a vision of the economy and decide what to invest in, then they would look at one stock at a time and make a decision.

In use, an investment profile of the subject is generated based on the at least one interactive input exercise in operation **2012**. Coaching is also provided for the subject based on the generated investment profile. A display may be generated for the subject based on the generated investment profile. Note operation **2014**.

Figure **27** illustrates a flow chart for determining a market attitude in a network-based financial framework. The instant aspect of the present invention is able to come to a conclusion about a person. For example, it may determine how confident a person is about the future. Online polling is one technique that allows the present invention to become the basis of a customer's long-term parameters. It achieves a systematic attempt to capture one's perspective on the economy as a whole. First, an expert is selected utilizing a network in operation **2100**.

Next, an opinion from the expert is rendered utilizing the network and witnessed in operation **2102**. At least one evaluation of the expert's opinion is then received from

a subject utilizing the network. Note operation **2104**. As an option, the step of obtaining the evaluation may be accomplished by displaying to the subject a plurality of choices for expressing the subject's agreement with the opinion of the expert, receiving a selection of one of the choices from the subject utilizing the network, and storing the selection. In one aspect of the present invention, the plurality of choices displayed to the user may include the following: strongly agree with the opinion, agree with the opinion, neutral to the opinion, disagree with the opinion, and/or strongly disagree with the opinion.

In operation **2106**, the subject may be permitted to select at least one other expert utilizing the network after which operations **2100-2104** of the present invention may be repeated. The evaluation(s) may then be aggregated from one or more subjects, as indicated in operation **2108**.

Thereafter, in operation **2110**, at least one financial model is built based on the aggregated evaluation from the subject. As an option, the financial model may be selected from a model based on the future of a financial index, a model based on an interest rate curve, and a model based on a gross domestic product (GDP). Further, the financial model is displayed in operation **2112** utilizing the network. In one aspect of the present invention, the subject may be coached utilizing the network. See operation **2114.** Such coaching may be based on the financial model.

Figure **28** is a flowchart illustrating a method **2200** for affording a graphical user interface in an investment management framework. First, in operation **2202**, transactions are performed involving the purchasing and selling of investments utilizing a network. Further, in operation **2204**, performance of the investments are monitored utilizing the network. Information on at least one of the investments may be selected by a user, and then retrieved and tracked utilizing the network. See operations **2206** and **2208**.

In one embodiment of the present invention, an investment model may be generated based on criteria entered by the user. As an option, performing transactions, monitoring performance, retrieving information, and tracking information are each performed in response to the selection of an icon on a site on the network.

In another embodiment of the present invention, profile information may be retrieved on the user utilizing the network. Further, the information on at least one of the investments may be retrieved based on the profile information.

Figure **29** is a flowchart illustrating a method **2300** for providing a communication medium in a financial management framework. Initially, in operation **2302**, a first user is presented a plurality of options relating to communicating with a second user. Such options are selected from the group consisting of electronic mail, a chat room, video, and voice. An indication of a selection of one of the communication options is then received utilizing a network. See operation **2304**. A communication medium is subsequently established between the first user and the second user utilizing the network based on the selection. Note operation **2306**.

In one embodiment of the present invention, a window is displayed for communication via video upon the selection of the video option. The investment management information may also be displayed simultaneously with the window.

In another embodiment of the present invention, a chat room may be opened upon the selection of the chat room option. Further, an electronic mail browser may be opened upon the selection of the electronic mail option.

Figure **30** is a flowchart illustrating a method **2400** for filtering a list of companies in an investment management framework. First, in operation **2402**, a request for changes in an investment portfolio is received from a user utilizing a network. Next, in operation **2404**, a database is queried including a list of companies. Companies on the list are subsequently identified based on the changes in the investment

portfolio. See operation **2406**. Such identified companies are then displayed to the user utilizing the network, as indicated in operation **2408**.

In one embodiment of the present invention, the identified companies represent viable investments based on the changes. Further, the changes may include a change in an amount of desired risk in the investment portfolio.

As an option, an amount of risk associated with each of the displayed companies may be depicted. Further, an industry in which each of the displayed companies reside may be displayed.

Figure **31** is a flowchart illustrating a method **2500** for generating a risk/reward map in a graphical user interface. First, in operation **2502**, a time range and a monetary range is first identified. Thereafter, in operation **2504**, an amount of desired risk is received utilizing a network. A curve indicating monetary values is subsequently plotted as a function of time values based on the received amount of desired risk. See operation **2506**. Further, in operation **2508**, the curve may be displayed utilizing a network.

In one embodiment of the present invention, the amount of desired risk may be received by selecting a toggle icon. Further, the amount of desired risk may be displayed upon the selection thereof.

Figure **32** is a flowchart illustrating a method **2600** for providing coaching in a graphical user interface. First, in operation **2602**, a user is identified utilizing a network. Next, in operation **2604**, a first database including investment portfolio information pertaining to the user is queried. Such investment portfolio information pertaining to the user is subsequently retrieved, as indicated in operation **2606**. A second database including coaching strings is then queried based on the retrieved investment portfolio information. Note operation **2608**. The coaching strings are

then retrieved in operation **2610** for being displayed to the user utilizing the network.

In one embodiment of the present invention, the coaching strings may include text which advises the user regarding an investment portfolio of the user. Further, the coaching strings may be displayed in a window.

In another embodiment of the present invention, a video may be shown which includes a coach that presents information relating to the coaching strings. As an option, the user may be allowed to converse with the coach. In one aspect, the user may be allowed to converse with the coach via electronic mail.

Figure **33** is an exemplary graphical user interface **2700** that embodies the various concepts and methods set forth in Figures **22-26**. As shown, the graphical user interface **2700** includes a plurality of fundamental selection icons **2702** including a my page icon **2703** for displaying a graphical user interface specifically tailored for a particular user, a save icon **2704** for saving any changes made to the graphical user interface **2700**, an export icon **2706** for exporting data displayed by the graphical user interface **2700**, a print icon **2708** for printing various fields of the graphical user interface **2700**, a help icon **2710** for obtaining help information, and an exit icon **2712** for exiting the graphical user interface **2700**.

Further displayed on the graphical user interface **2700** is a plurality of mode icons **2720** for initiating various modes of operation, as indicated during reference to Figure **28**. The mode icons **2720** include a transact icon **2722** for initiating transactions involving the purchasing and selling of investments utilizing a network, a monitor icon **2724** for monitoring the performance of the investments, a model icon **2726** for generating an investment model based on criteria entered by the user, an explore icon **2728** for retrieving information on the investments, and a track icon **2730** for tracking the investments utilizing the network.

With continuing reference to Figure **33**, a communication medium **2732** may be employed to converse with other users, namely financial advisers, etc. Such communication medium **2732** includes a window **2734**, and a plurality of communications icons **2736** that enable various types of communication, as set forth during reference to Figure **29**. Such communications icons **2736** include an e-mail icon, a chat icon, a voice icon, a talk icon, a clips icon, and a video icon.

A filtering field **2760** is also shown in Figure **33**. Such filtering field **2760** includes a plurality of companies and associated risk levels and industries which are displayed in accordance with the method associated with Figure **30**. A risk/reward map **2762** is also shown which operates in a manner set forth during reference to Figure **31**. Also shown is a coaching window **2770** for displaying coaching strings **2772** in a manner set forth during reference to Figure **32**. Such window **2770** may include a field adjustment bar **2774** in order to facilitate viewing of the coaching strings **2772.**

Further features associated with the graphical user interface **2700** include an information window **2774** which illustrates various charts pertaining to sector diversification and other investment parameters. A portfolio model window **2776** may also be displayed for modeling purposes. It should be noted that the various services provided by the present invention may be initiated by selecting corresponding service icons **2780**. Further, a profile may be viewed and adjusted using a plurality of profile icons **2782**.

Figure **34** is a flowchart of a process **3400** for aggregating an individual historical portfolio in accordance with an embodiment of the present invention. Historical positions of a plurality of investments of a user are received in operation **3402** so that a historical analysis of each of the investments can be performed in operation **3404**. The historical analyses of the investments are then aggregated to form aggregated portfolio in operation **3406**.

In one embodiment of the present invention, the contribution of each of the investments in the aggregated portfolio may also be determined. In another embodiment of the present invention, further information may be received relating to a proposed trade so that an analysis can be made as to the effect of the proposed trade on the aggregated portfolio based on at least one of the following: an impact on the growth of the aggregate portfolio as a result of the proposed trade, an impact on a value at risk (VaR) of the aggregate portfolio as a result of the proposed trade, and an impact on volatility of the aggregate portfolio as a result of the proposed trade.

In an aspect of the present invention, performing the historical analysis for each of the investments may also include obtaining a historical time series for each of the investments and then analyzing the historical positions of each investment based upon the historical time series associated with the respective investment to generate the historical analysis of the respective investment. In another aspect of the present invention, the historical position of each investment may be retrieved from a database. In a further aspect of the present invention, the historical analysis of each investment may also include a calculation of a mean at endpoints of the historical analysis for the respective investment.

Figure **35** is a flowchart of a process **3500** for filtering investments based on portfolio characteristics using a network-based personal investment manager in accordance with an embodiment of the present invention. Filter(s) are generated based on characteristics of a portfolio of a user in operation **3502**. Information relating to one or more investments is also obtained in operation **3504**. The obtained information is then filtered in operation **3506** utilizing the filter(s) so that the portfolio of the user can be modified based on the filtered information in operation **3508**.

In an aspect of the present invention, the characteristics of the portfolio may include personal information relating to the user. In another aspect of the present invention, the characteristics of the portfolio may include information relating to the user. In a

further aspect of the present invention, the characteristics of the portfolio may include a growth coefficient for the portfolio. In yet another aspect of the present invention, the characteristics of the portfolio may include a correlation between at least one index and the portfolio.

In an additional aspect of the present invention, the characteristics of the portfolio may also include a ratio of sigma to mean portfolio valuation. Additionally, the characteristics of the portfolio may further include Value at Risk (VaR) and/or a Beta. In yet another aspect of the present invention, the information relating to the one or more investments may be obtained utilizing a network.

Figure **36** is a flowchart of a process **3600** for portfolio forecasting using a network-based personal investment manager in accordance with an embodiment of the present invention. A network is utilized to obtain a current position of an investment portfolio of a subject in operation **3602**. A forecast is then generated in operation **3604** from the current position for the investment portfolio. The forecast is then transmitted and displayed to a user utilizing the network in operation **3606** and **3608**.

In one embodiment of the present invention, a future value for the investment portfolio may also be determined when future markets are different from past markets. In an aspect of the present invention, generating the forecast from the current position for the investment portfolio may also include projecting a current value of the current position of the investment portfolio forward using a compound growth factor. In another aspect of the present invention, generating the forecast from the current position for the investment portfolio may further include projecting a current value of the current position of the investment portfolio forward using a volatility from a historical analysis of the investment portfolio. In yet another aspect of the present invention, generating the forecast from the current position for the investment portfolio may additionally include applying compound growth and volatility using at least one back-tested parameter to determine a future value for the investment portfolio. As another option, generating the forecast from the current

position for the investment portfolio may include representing growth as an annuity with regular contributions to determine a further portfolio value.

Figure **37** is a flowchart of a process **3700** for gauging past, present and future performance of an investment portfolio in a network-based personal investment manager. A current position of an investment portfolio of a subject is obtained in operation **3702**. Next, a historical position of the investment portfolio is obtained in operation **3704** utilizing a network. Based on the historical position of the investment portfolio, a historical analysis of the investment portfolio is executed in operation **3706**. In operation **3708**, a current analysis of the investment portfolio is also executed based on the current position of the investment portfolio. Additionally executed is a future analysis of the investment portfolio in operation **3710**. After the historical, current and future analyses have been executed, they are displayed to a user in operation **3712**.

In one embodiment of the present invention, executing the historical analysis of the investment portfolio may further include obtaining a historical time series for the investment portfolio utilizing the network so that the historical position of the investment portfolio can be analyzed based on the historical time series to generate a historical analysis of the investment portfolio. In another embodiment of the present invention, executing the current analysis of the investment portfolio may include utilizing the network to obtain a historical time series for the investment portfolio and then generating a current analysis of the investment portfolio based on an analysis of current positions of investments included in the investment portfolio and the historical time series.

In a further embodiment of the present invention, executing the future analysis of the investment portfolio may further include utilizing the network to obtain a current position of the investment portfolio, and then projecting a current value of the current position of the investment portfolio forward using a compound growth factor, and/or a volatility from a historical analysis of the investment portfolio.

Figure **38** is a flowchart of a process **3800** for providing a portfolio history in a network-based personal investment manager in accordance with an embodiment of the present invention. Information about an investment portfolio is requested from a user utilizing a network in operation **3802**. The information about the investment portfolio is also received in operation **3804** from a user utilizing the network. The received information includes historical information about the investment portfolio. A historical analysis of the investment portfolio is performed in operation **3806** utilizing the received information about the investment portfolio. The historical analysis of the investment portfolio is then transmitted to the user utilizing the network in operation **3808**.

In one aspect of the present invention, the information received from the user may be provided using online financial exchange (OFX) protocol which is a variant of extended markup language (XML). In another aspect of the present invention, performing the historical analysis of the investment portfolio may also include a calculation of a mean at endpoints of the historical analysis.

In an embodiment of the present invention, a historical time series for the investment portfolio may also be obtained utilizing the network. In another embodiment of the present invention, capital gains taxable exposure may also be determined based on the historical analysis. In a further embodiment of the present invention, a compound growth factor may also be determined based on the historical analysis. In event another embodiment of the present invention, a Value at Risk may be determined based on the historical analysis utilizing a variance method computation.

The various embodiments described above are provided by way of illustration only and should not be constructed to limit the invention. Those skilled in the art will readily recognize the various modifications and changes which may be made to the present invention without strictly following the exemplary embodiments illustrated

and described herein, and without departing from the true spirit and scope of the present invention, which is set forth in the following claims. olio.

Although only a few embodiments of the present invention have been described in detail herein, it should be understood that the present invention may be embodied in many other specific forms without departing from the spirit or scope of the invention. Therefore, the present examples and embodiments are to be considered as illustrative and not restrictive, and the invention is not to be limited to the details given herein, but may be modified within the scope of the appended claims.